



**US Army Corps
of Engineers**
Engineering and Support
Center, Huntsville

DIRECTORATE OF ENGINEERING QUALITY ASSURANCE PROGRAM

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DIRECTORATE OF ENGINEERING QUALITY ASSURANCE (QA) PROGRAM

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FOREWORD

This document presents the quality assurance program for the Directorate of Engineering, U.S. Army Engineering and Support Center, Huntsville. Organization and responsibilities relative to a typical Directorate of Engineering project are discussed. Quality control procedures for each Directorate of Engineering product are presented in appendixes B through P.

Changes and revisions to this document will be made as needed. Address any inquiries to Commander, U.S. Army Engineering and Support Center, Huntsville, ATTN: CEHNC-ED-SY, P.O. Box 1600, Huntsville, AL 35807-4301.

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CHAPTER 1

QUALITY MANAGEMENT PLAN

1-1. INTRODUCTION

The Directorate of Engineering (ED) is a multidisciplined architectural and engineering organization, which supports the U.S. Army Engineering and Support Center, Huntsville's (USAESCH) highly specialized and diversified missions and programs. Mission support includes design of conventional military facilities, hazardous material storage facilities, complex first-of-a-kind hazardous chemical and munition processing facilities, ballistic missile defense installations, and military training ranges. Engineering Directorate is responsible for the technical adequacy of all architectural and engineering designs of facilities for the Department of Defense, Department of Army, and other governmental agencies.

Engineering Directorate's Quality Assurance Program (QAP) establishes the architectural and engineering control policies and practices needed to provide quality services to all our customers. Using total quality management concepts, the QAP assigns quality control responsibilities, identifies key quality control interfaces with project development processes, and identifies quality control practices and tools needed to deliver quality products and services.

This manual has been checked against ISO 9001.

1-2. QUALITY ASSURANCE PHILOSOPHY

Our philosophy is that quality is everyone's responsibility. Quality management is not a process, but a commitment to excellence. Quality control is not a procedure superimposed on top of the normal work process, but a professional work ethic and positive attitude that controls the way team members accomplish their assigned task. We do not view quality assurance as a simple check and balance system, but an opportunity for each individual on the team to improve quality. Therefore, total quality can only be realized through a combined effort of all affected elements of the Directorate of Engineering. ED will seek full and active participation of its entire workforce, will diligently protect the needs and desires of the customer, and will continuously search for new methods to improve the quality of our products and services.

1-3. MANAGEMENT POLICY

Engineering Directorate's management policy is to deliver quality architectural and engineering design services and products which conform to mutually agreed upon requirements of the customer, on schedule and within budget. In the process of implementing this policy we will focus on consistent and uniform implementation of Corps architectural and engineering policy, life safety codes, compliance with environmental laws and regulations, sound technical criteria, functionality, construction cost, schedule, and design costs.

We will develop high quality architect-engineering products through the conscientious, cooperative efforts of each project team member. Essential elements in these efforts are: Leadership, planning, organization, teamwork, technical capability and accountability, communications, integration, and coordination.

1-4. QUALITY ASSURANCE PROGRAM

a. General. The Quality Assurance Program consists of the quality management plan and the quality control plan as the quality standard or framework for all USAESCH programs and a design quality control plan that is prepared for each specific project. Quality policies and procedures are identified for flow of information and approval controls within these three plans. Quality planning will be accomplished to the extent necessary to provide:

(1) Identification and documentation of the methods, procedures, and organizational responsibilities that are necessary to ensure a systematic approach to, and compliance with, the requirements of this plan.

(2) Control over activities affecting quality, including the verification of quality, to the extent consistent with the activities' importance.

(3) Assurance that activities affecting quality which require procedures, activity plans, technical or design reviews, equipment, or personnel training/skills to attain the requisite quality are identified, developed, and implemented.

(4) Assurance that documents prescribing quality-affecting activities (e.g., procedures, specifications, drawings, plans) are subject to review and approval to verify that prerequisites have been satisfied and that the activity can be accomplished as specified.

(5) Assurance that quality affecting activities will be accomplished under suitably controlled conditions, which include use of specified procedures or instructions, or special conditions for accomplishing the activity, and assurance that all prerequisites for the given activity have been satisfied at the start of the activity.

b. Quality Management Plan (QMP). The QMP establishes the ED management approach and principles which guide the Quality Assurance Program. This approach is based on the leadership philosophy, management principles, and concepts of the Total Army Quality Program. The QMP focuses on continuous process improvement to meet or exceed the expectations of internal and external customers.

c. Quality Control Plan (QCP). The QCP is a generic plan for executing quality architectural and engineering products or services, on schedule and within budget. The QCP defines standard individual responsibilities and control procedures that must be present to deliver all quality products and services developed and designed by ED. Thus, the Technical Manager uses the QCP as basic guidance when he prepares the project-specific design quality control plan (DQCP). The QCP will be standard reference for all ED personnel.

d. Design Quality Control Plan (DQCP). The technical manager will prepare a specific design quality control plan (DQCP) for each project or program. The DQCP will incorporate generic procedures from the QCP as well as special procedures and requirements unique to a specific project. For contracted services all firms will prepare and submit a QCP. This plan will be

incorporated into the HNC design quality control plan. The completed DQCP will then be incorporated into the project management plan.

1-5. PROGRAM OBJECTIVES

- a. Provide quality assurance for all ED activities.
- b. Continue to evaluate and improve quality control tools and methodology at all levels in ED.
- c. Complete all work within budget (man-hour and programmed amounts) and on schedule.
- d. Provide architectural and engineering services and products at competitive costs.
- e. Comply with USACE and customer technical criteria, industry standards, national, state and local regulatory requirements (including life safety and health), as applicable in engineering and design services and products.
- f. Satisfy written and mutually agreed upon customer requirements and needs, i.e., functional, operational, and aesthetic.
- g. Minimize design and construction time and cost growth.

1-6. PROGRAM IMPLEMENTATION

This QMP implements ER 1110-1-12, Engineering and Design Quality Management, which provides general policy and principles necessary to obtain quality architectural and engineering design products and services. The quality assurance procedures and policies in this manual apply to all elements of the Directorate of Engineering, Huntsville Center. The QMP provides a verification "road map" for the quality control operations within the Directorate of Engineering. This plan is a living document and will be reviewed periodically and modified, as needed, to meet future changes in assigned programs, workload, staffing, and organizational structure. All documents relevant to design quality are identified in the references' list in appendix A of this document.

1-7. PARTNERING

Developing quality in a program is an individual responsibility, but total quality can only be achieved through a combined effort of all participants. Therefore, achieving quality assurance requires partnering with our customers. Because of our technical expertise, team members will advise the customer when, in our judgment, the customer's requirements are not technically or fiscally feasible. ED will diligently protect the customer's needs and desires. ED's team will use partnering to identify mutual goals and objectives of all parties and to assure that the requirements of our customers (both external and internal) are met and expectations are fulfilled. Partnering agreements are encouraged on all large and complex HNC construction programs and services as well as projects requiring planning, engineering, and design.

1-8. PROGRAM AUDITING

An independent audit team, designated by the Director of Engineering, will be responsible for conducting QA audits within the Directorate of Engineering. The procedures attached to this

plan as appendixes B through P will be tested by the team to ensure that procedures are being properly implemented and that up-to-date procedures are available to all personnel. After the audit, the team will prepare and submit to the Director of Engineering an audit report. The report will identify any problem areas and recommend possible solutions.

1-9. CONTROL OF QUALITY ASSURANCE RECORDS

The official Quality Assurance records will be maintained by the Engineering Directorate quality assurance engineer who is a member of the QA Oversight Team. These records will include the primary controlled Quality Assurance Plan, the official audit reports, and copies of all official training and skills documentation. The branch chief will be responsible for maintaining reference copies of all quality assurance files as outlined elsewhere in this document.

1-10. QUALITY ASSURANCE OVERSIGHT TEAM

There is an Engineering Directorate Quality Assurance Oversight Team which serves at the pleasure of the Director of Engineering to assure that the QA program document is maintained in current form and meets the current needs of HNC regarding total Army quality, ISO 9000, Army Performance Improvement Criteria (APIC), or other applicable requirements. This committee is also responsible for implementing the requirements of paragraph 1-8, Program Auditing, when required by the Director of Engineering. Currently, the committee is composed of:

	James B. Hudson	ED-ES	Chairman	
	Paul Lahoud	ED-CS	Chief of Design	
	Arkie Fanning	ED-SY	Q/A Engineer	
	Robert Riffel	ED-CS	Member	
	Adib Farsoun	ED-CS	Member	
	Steve Pinke	ED-ME	Member	
	Thomas Sykes	ED-ES	Member	
	Lee Sulzberger	ED-CS	Member	
Advisors are:	Bill Johnson	CH		
	Mike Stahl	PM		
	John Sikes	OE		
	Susan Smallwood	CT		

Any committee member can be contacted for assistance in implementation of this document.

CHAPTER 2

QUALITY CONTROL PLAN (QCP)

2-1. GENERAL

The QCP is a generic plan which establishes responsibilities, procedures, and policies for delivering a quality architectural and engineering product or service. The goal of the QCP is to make quality an inherent part of the design process. This chapter is the basic framework for the Directorate of Engineering's quality control plan. The following is ED's overall approach to quality.

- a. Quality involves the work ethic and performance attitude under which ED personnel perform their work.
- b. Quality is added to the product or service when the Branch Chief provides a supportive work environment, the resources, and the tools to complete the assigned tasks through workload planning, supervision, and technical expertise; through proper definition of job requirements and goals; and through the use of appropriately skilled personnel.
- c. Quality is verified through management processes that confirm that all ED products and services satisfy customers' needs and expectations and when lessons learned are incorporated to ensure a continuous improvement of the system.
- d. Quality is assured by the Director of Engineering through surveillance, customer surveys, internal auditing, and lessons learned incorporated into future projects and programs.

2-2. TECHNICAL MANAGEMENT AND COORDINATION

Ensuring that engineering products are in compliance with headquarters policy is the responsibility of the Engineering Directorate. Everyone associated with the production of the product or service is responsible for the control of quality. This includes professionals assigned the task and individuals with review and management responsibilities who provide assistance and support to complete the work. Techniques and tools such as peer and cross-discipline internal reviews; independent technical evaluations; biddability, constructibility, operability, environmental (BCOE) reviews; customer and user reviews; alternate calculations; comparison of similar successful work; design reviews; automated-checking; and technical supervisory reviews can be employed to assure quality.

- a. Approach. The quality control plan will define the technical management methodology to be followed during the execution of the work. The method should state the engineering development approach and process requirements needed to produce the product or service, and should identify who will do each component of the work. The customer should be involved throughout the product development and delivery process, including periodic review. A technical manager (TM) will be the CEHNC-ED point of contact with the project manager and the customer, and is the engineering team point of contact for technical engineering and design support for each program or project. A team meeting, or predesign conference, with the customer(s), TM, PM, and engineering team should be held to discuss the scope of the project, special requirements, and work approach.

b. In-house team coordination. Communication, coordination, and interaction among team members can be effected through team meetings, progress monitoring, periodic reviews, etc. The TM will promote and ensure that continued communication and coordination is being maintained between members of the engineering team, functional supervisors, and the PM.

c. A-E design and service contractor coordination. The TM will make every effort to ensure the contractor fully understands the scope of work, requirements of the customer, and the product being produced. Progress meetings, as appropriate, should be held to ensure the work is progressing based on the scope requirements. The TM will maintain open and ongoing communications with the contractor. Also, the TM or Contracting Officer will make the contractor fully aware during negotiations of the manner in which (s)he will be evaluated.

2-3. ACHIEVING DESIGN QUALITY

In general, a design or service that conforms to the customer's requirements and expectations (i.e., functional, technical, aesthetic, environmental, health, and safety) and which is consistent with the appropriate technical criteria is an acceptable level of quality. Elements critical to achieving design quality are listed below.

a. Criteria definition meetings are a critical step in understanding customers' needs. It is ED policy that a criteria definition meeting is a mandatory part of the project delivery. At the meeting, HNC designers will discuss detailed features of the project with the user and solidify the project scope. From this scope, the HNC design team develops the design budget based on past histories and project experience and develops the schedule for the project. The completed schedule will be reviewed and approved by all parties.

b. Criteria changes, once the customer's needs are identified, must be avoided. Unforeseen changes after the initial project criteria have been completed must be documented, and the impact of the changes on the budget and schedule must be addressed to the customer.

c. A predesign conference will be held to discuss project scope and requirements prior to initiating the engineering services, studies, or design work. Technical disciplines along with client representatives should attend. A statement of design and functional requirements for the project as well as the required technical criteria should be prepared prior to this conference.

d. Design team meetings will be held periodically throughout the duration of the project. These meetings involve the design team members, the TM, and when appropriate, the Chief of Design, and division and branch chiefs. The purpose is to discuss the progress of the design by discipline as well as changes or impacts to the design.

e. Independent Technical Reviews (ITR) will be performed by the branch chiefs or designated senior personnel. *In no case, will the reviewers be part of the design team on the project.* This review provides an independent verification, enhances teamwork, evaluates designer abilities, and identifies individual developmental needs for training.

2-4. DESIGN QUALITY TOOLS

a. The development of design tools is a continuing process. It is each individual's responsibility to evaluate an existing design tool's applicability and report to management any problems with the tool's implementation. Individual's should also seek out new tools which would

enhance or improve the quality of a given process, product, or service.

b. The following are the design quality tools and processes that are available to enhance the quality of ED products and services. The purpose of these is to help in identifying those individual verification tools which will support any assigned task. Design quality systems and available resources are as follows:

(1) Construction Criteria Data Base (CCB). The CCB is the most complete single source of electronic criteria data base available. The data base contains both military and other federal construction

agencies' guide specifications, technical manuals, standards, cost estimating system, and other information.

(2) Corps of Engineers Guide Specifications (CEGS). The CEGS are available on the CCB and should be used to prepare the project specification. CEGS are based mainly on commercial standards and will improve the quality of any product.

(3) Corps of Engineers Abridged Guide Specifications (CEAGS). The CEAGS is an abridged, or shortened, version of the CEGS. CEAGS are used primarily on projects such as maintenance and repair, which do not require complete codes and standards found in CEGS.

(4) Microcomputer-Aided Cost Engineering System (MCACES). MCACES is an automated cost estimating tool which is used in the planning, programming, design, and construction processes.

(5) Automated review management system (ARMS). ARMS is a minicomputer resident system that provides an effective mechanism for managing design review comments. It provides support in four primary user levels: (a) Technical manager, (b) review manager, (c) reviewer, and (d) project designer. ARMS capitalizes on the computer's ability to organize and track multiple aspects of generating and responding to design review comments.

(6) Centers of expertise. Centers of expertise are valuable information resource centers (ER 1110-3-109 lists centers of expertise).

(7) Centers of Standardization (COS). These are valuable resources on high visibility Army-wide standard facility types.

(8) Lessons learned data base.

(9) Checklists. See examples in ER 1110-1-12, appendix H.

c. The following are types of technical design reviews which are commonly used:

(1) Functional Criteria Review: Focuses on project criteria verification, footprint for design effort, project requirements, users' needs, functional flow, space requirements, siting requirements, and special requirements.

(2) Technical Review: Addresses technical adequacy (Is it complete?), will the design work (Is it practical?), clear intent (Is it evident to all parties?).

(3) Biddability, Constructibility, Operability and Environmental (BOCE): Contractor can bid the job, contractor can build the project, owner/user can effectively operate and maintain the project. All environmental considerations will be satisfied.

(4) Coordination Review: Interdisciplinary reviews are everyone's responsibility and include coordinating review comments.

d. Levels of review

(1) Minimum Review: This level of review applies when the size, scope, and complexity of the project do not warrant a more detailed effort. An example application would be contracts for design services that deliver typical commercial work where the contractor has responsibility for quality. A minimum review consists of:

- < A scan of project documents for familiarization with the scope and completeness
- < Focused review of critical areas such as life safety, unique or costly features that could result in a project that fails to meet the customer's needs
- < Review the checklist of typical repetitive deficiencies and design feedback derived from lessons learned, and check for application to the project.
- < Biddability, constructibility, operability, and environmental evaluation

(2) Normal Review: This level of review is typical for most projects or programs where the scope and complexity are significant. The goal in this case is to eliminate major design deficiencies and most minor ones. A normal review consists of:

- < A scan of project documents to determine if all submittal elements are included and for the reviewers to familiarize themselves with the design.
- < A detailed review of critical elements, performed in-depth
- < Review the checklist of typical repetitive deficiencies and design feedback derived from lessons learned, and check for application to the project.
- < Perform interdisciplinary review to assure that significant conflicts do not exist.
- < Biddability, constructibility, operability, and environmental evaluation

(3) Maximum Review: This type of review is required for highly complex, costly, and high visibility projects. Examples would be Chemical Demil facilities, Ballistic Missile facilities, and all in-house designs. The goal is to assure an organized approach to identifying and correcting all significant design deficiencies. A maximum design review would include:

- < Use of a structured review plan that addresses all disciplines.
- < A scan of the project documents to determine if all submittal elements are included and for the reviewers to familiarize themselves with the design.
- < Prioritize design elements for detailed review

- < In-depth interdisciplinary review including coordination of drawings and specifications
- < In-depth biddability, constructibility, operability, and environmental evaluation

2-5. ENGINEERING SITE VISITS

Early in the project schedule the designers, TM, PM, customers, and contractors should perform site visits to develop a general perspective of existing conditions and how they may apply to the project. Existing field conditions such as survey data and utility locations should be verified in accordance with ER 1110-2-112.

2-6. DESIGN QUALITY PROGRESS PROCESS

a. Milestones and subproducts. Besides the milestones required for the project management and AMPRS reporting, milestones will be established when definable levels of product completion are achieved and ready for review. The number and frequency of milestones will depend on the complexity, the schedule, customers' requirements, and other particular requirements. Typical milestones may include concept (approximately 35%), intermediate, and final design reviews. Milestone requirements for BCOE reviews should be in accordance with ER 415-1-11, Biddability, Constructibility, Operability, and Environmental (BCOE). A list of subproducts should be developed that identifies dependent subproducts and submissions required by different disciplines, contract product submissions, survey and field data, etc. The list should include the producing and receiving organization, and the due date. How sophisticated the list of subproducts needs to be depends on the project and schedule. The more refined the list, the more control there will be over concurrent operations by dependent organizational elements, but the larger the number of subproducts and submissions, the more effort is needed to prepare and monitor a product program.

b. Project schedule. The PM and TM will jointly develop a project schedule to monitor product design progress and expenditures. The product schedule will include dates for major milestones (concept, intermediate, and final) in-house reports and A-E contract schedules.

c. Construction cost control and schedules. The construction cost estimate and schedule will be reviewed and updated periodically or at key times during execution of the product. Periodic updates should coincide with the review milestone dates. Updates and refinement will also be considered when surveys and field data result in significant changes in quantities, greater knowledge of problems, and project scope changes that affect the anticipated method of construction.

2-7. DESIGNER SELECTION PROCESS

An essential part or ingredient of quality control is the designer or team member selection process. Selecting the right contractor or the correct team member is the first step to successful completion of a given project or task. Prior to making a decision whether to accomplish the work in-house, management must fully consider the availability and level of expertise required in all the associated disciplines. The technical skills, experience, and qualifications of the selected architect or engineer must match the complexity of the specific task. The decision to perform the design within ED or via a contractor will be made jointly between the Chief of Design, the Director of Engineering and the Director of Programs and Project Management.

2-8. DESIGNER INVOLVEMENT DURING ADVERTISEMENT, CONSTRUCTION, OR EXECUTION OF FIELD WORK

a. Designer responsibility during advertisement. The TM is responsible for responding to bidders' inquiries, coordinating correction and omissions to the contract documents, and preparing amendments during advertisement.

b. BCOE comments. For construction projects, the PM and TM are responsible for assuring that responses and necessary actions pertinent to the BCOE review have been taken. Review forms noting action taken for each comment must be furnished to construction for approval prior to the bid opening.

c. Engineering involvement during construction. Designers will support the project by being involved during construction. Designers will review submittals identified for engineering review, value engineering and contractor proposal review, and visit sites at critical times to ensure that design intent is being achieved (reference ER 1110-2-112, Required Visits to Construction Sites by Design Personnel), attend preconstruction and preparatory meetings, provide technical support for redesign and evaluation of changed site conditions, and support partnering involvement. The designer will obtain feedback from construction on lessons learned and quality of design, and on improvement changes that can be implemented in future similar designs. In the case of A-E design, the design contract will include these services as options.

d. As-built drawings. For ED projects where HNC has a construction support role, as-built drawings will be obtained after construction is completed, reviewed for accuracy, and incorporated into the contract drawings. Disposition of completed as-builts will be in accordance with ER 1110-2-1200. Drawings that are critical to the safety of project operations and personnel will be completed in a timely manner.

e. Lessons learned. Pursuant to ER 1110-1-12 and the CEHNC Strategic Plan Goals, a lessons learned feedback system will be implemented to provide a structured process for assuring continuous improvement in future products. All design and construction deficiencies/lessons learned recommendations must be reviewed by the team responsible for the specific project involved. Errors or problems with guide specs or technical manuals will be submitted to higher authority on ENG Form 3078 following procedures of the Engineering Improvement Recommendation System.

2-9. RESPONSIBILITIES

Management, supervisors, designers and other team members, and contractors will be held accountable for the professional quality, technical accuracy, and coordination of all designs, drawings, specifications, cost estimates, contract schedules and construction project cost limitations and other services provided. Architect-engineers will meet the responsibilities set forth in ER 715-1-10, Architects-Engineers Responsibility Management Program. In-house designers are similarly responsible for producing quality products and services on schedule and within budget.

ED personnel and contractors may incur liability from either failure to meet the standards of care reasonably associated with the profession or breach of a fiduciary duty to exercise skill and care in performing services. Regardless of the legal theory related to liability and accountability, the professional standard of care to be applied is the same measurement standard used to determine malpractice of doctors, lawyers, and other professionals who provide services involving

the health, safety, and welfare of the public. This standard essentially requires a designer, government or contractor, to exercise such reasonable care, skill, and diligence as one in that profession would ordinarily exercise under similar circumstances. Achieving quality control is assured when conscientious individuals understand their responsibility.

a. The Chief of Design is responsible to the Director of Engineering for ensuring the technical adequacy of all architectural and engineering products. (S)He has overall responsibility for technical coordination and completion of all architectural and engineering products. This QC role is maintained through close liaison and interface with project managers, division chiefs, branch chiefs, the technical manager, and the customer. The Chief of Design's primary responsibility is to ensure that appropriate manpower, funds, schedule, and resources are available to properly execute the assigned task using either in-house resources or contract services. His other responsibilities include:

- (1) Assuring the development of a suitable DQCP for each project or program.
- (2) Appointing the technical manager for each program or project.
- (3) Meeting with project teams as required.
- (4) Participating in the acquisition decision process regarding in-house versus A-E design.

To assure that this plan effectively meets its objectives and complies with applicable requirements, the Chief of Design, through assigned representatives, will conduct periodic checks.

b. The Division Chief is responsible for assuring that all architectural/engineering services provided by this division are high quality, meet all requirements imposed on the division, and are delivered on schedule and within budget. (S)He is responsible for monitoring the quality system to assure continuous improvement and to assure the system meets the needs of a project or program. The Division Chief will ensure that:

- (1) The appropriate disciplines are involved in the task.
- (2) The best available design quality tools are used.
- (3) Resources and appropriate training are available to the teams.
- (4) Schedules and budget are realistic.
- (5) Policy regarding functional, health, and safety requirements are never compromised.
- (6) Needs and concerns when surfaced by the TM are positively addressed.
- (7) Procedures provided in the appendixes are followed.

c. The Branch Chief is responsible for the allocation of resources, manpower, and materials to ensure that the completed task is the highest quality possible and is completed on schedule and within budget. Branch chiefs are responsible for performing engineering product

quality control, and for ensuring that current technical criteria are used for preparing design products and services. They also must ensure consistent application and implementation of all relevant engineering policy. His(her) technical diverse expertise and broad perspective makes the Branch Chief an integral part of the team. Other responsibilities include ensuring that:

- (1) Appropriate design quality tools are available and are being used.
- (2) Best qualified personnel are assigned (matching the qualifications of the team member with the project's special design requirements).
- (3) Schedules and resource requirements are realistic and do not conflict with ongoing projects within the branch.
- (4) Proper internal quality control procedures are followed.
- (5) The design meets the standards established for the project (sketch, preliminary, concept, and final) and the functional, health, and safety requirements.
- (6) All suspenses are realistic, properly handled, and completed on schedule.
- (7) Lessons learned from past projects are applied to future work.

d. The Technical Manager is responsible for coordinating all technical interfaces. (S)He will ensure that all necessary technical input is forthcoming and that all interdisciplinary coordination is complete and accomplished in a timely manner. Other responsibilities include:

- (1) Preparing, reviewing, and coordinating DQCP's.
- (2) Reviewing and coordinating a contractor-prepared QCP for each product or service.
- (3) Technical interface with the PM and the customer to ensure that their requirements and expectations are reasonably satisfied and functional, health and safety requirements are never compromised.
- (4) Disseminating documentation that is clear and accurate to the appropriate teams prior to starting the project.
- (5) Documentation of guidance, direction and criteria provided for the in-house design team or contractor.
- (6) Coordinating Engineering Division's work on the assigned product, including technical direction of the contractor.
- (7) Monitoring the use of QC procedures to ensure consistent application by all team members.
- (8) Monitoring work progress and costs against the agreed upon budget for technical products and services.
- (9) Providing a central point of contact for all technical issues related to the project.

(10) Leading and facilitating all special meetings necessary for resolving technical problems.

(11) Keeping the Chief of Design informed about all significant technical issues which affect scope, cost, and schedule.

(12) Identifying and documenting changes in the scope of the project and notifying the PM and the Branch Chief.

(13) Assure that lessons learned are recorded for future reference.

(14) Act as the single point of contact within ED and coordinate and consolidate manpower resource estimates and schedules for project or program support.

(15) On contract services, the TM will be the focal point for assuring ED's role in the contractor acquisition process.

(16) Be present during all negotiations of technical scope and review and concur in the resulting resume of negotiations on technical scope contract elements.

e. The project functional designer is responsible for quality completion of the assigned task. Specific responsibilities include the following:

(1) Ensuring all criteria are fully documented prior to expending resources on project taskings.

(2) Conducting a code and standards search to identify and document technical codes, standards, regulations, and policies applicable to the assigned task.

(3) Identifying, coordinating, and interfacing with other disciplines to ensure their technical requirements are accommodated.

(4) Using design quality verification tools properly.

(5) Establishing realistic budget estimates for each assigned task.

(6) Reporting potential problem areas that might affect the quality or successful completion of a project to the branch chief and the technical manager.

(7) Completing the assigned task on-time, within budget, and at a level of quality that reasonably meets the requirements and expectations of the customer.

(8) Searching for the best available design tools, including existing standards - details and standard designs. Continually seeking out the state-of-the-art tools such as the Internet and emerging information technology to reduce design cycle time.

(9) Continuously seeking ways to improve individual proficiency, the efficiency of the team, and reduce the cost of doing business. Communicating recommendations through the Branch Chief.

2-10. MEASURING QUALITY

While producing a quality product is our main objective, continuously improving the quality process is our goal. Continuous monitoring and measuring the process is an important part of meeting this goal. Evaluating the effectiveness and efficiency of the process can be accomplished in several ways.

a. In-process monitoring. In most situations, measuring the effectiveness of the process during the design is only a “snapshot” in time and only indicates the level of quality at that moment during the production phase. Types of measuring tools are:

(1) Review comments. A measurement of quality is how well designers incorporate review comments. If the same comments are repeated from one review to another, it indicates that the quality assurance system is not being properly implemented. If this problem continues, the quality of the product will suffer.

(2) Number of significant review comments. Since quality is everyone’s responsibility, an indicator of poor quality is the number of significant comments. If a reviewer detects major deficiencies, it indicates that designers are not doing their job. Depending upon the design stage and if immediate actions are not taken, the quality of the product or service could suffer.

(3) In-progress customer review comments. Review of the customer’s comments can indicate whether or not the product or service is fulfilling the established criteria. This indicator may provide lessons learned feedback on the criteria development phase.

(4) Monitoring man-hour usage, expenditures, and schedules. Evaluating and comparing the man-hours charged to the level of completion and schedule will identify potential problems which may translate into performance and quality problems. Typically, if man-hour expenditure/available project funds are not commensurate with the level of completion, sufficient design funds will not be available to complete the assigned task. Cost and schedule/time growth will identify areas in the process that needs further attention or improvements. There may be cases where the cost and time growth is the result of criteria changes by the customer. In these cases, the design team will ensure proper documentation of all changes and their impact on the design effort. On the other hand, when the cost and time growth is internal to the functional discipline, the designer will be held accountable for the product through the performance process.

b. Continuous monitoring. Monitoring activities are important to the product and should be always accomplished. In those situations where course corrections are required, the adjustments can be made to assure a quality product. Another tool the Director of Engineering can use is Quality Assurance Audits. This measuring tool, available for use at any time, verifies that the process is in place to assure quality and verifies that quality is built into the product or service.

c. Post-design or Service Measurements. The ultimate determinate for quality can only be accomplished after the facility has been built and used or after the product has fulfilled its needs. For that reason, the following tools can be used to measure quality after the product or service was provided:

(1) Monitoring advertisement, bid, and award. While a product can be produced on time, if it cannot be bid, awarded, and constructed within budget, the product or service lacks quality. If the contract cannot be awarded within the CWE, more evaluation of the quality control

must be performed to determine the control mechanism that needs altered to assure the product is within budget.

(2) Monitoring amendments and change orders. The advertisement period is a critical phase for measuring quality of a product or service. The number and type of contractor questions and the number of amendments are indicators of quality. The lessons learned from this process can be fed back in the quality assurance process to improve the overall system.

(3) Customer surveys and feedback. Customer feedback can be requested at different phases. They are during the design as mentioned above, shortly after the product or service has been approved by management and the customer and finally, after the customer has used the product or service.

(a) Customer Feedback after design completion. At the completion of the designed project, the Directorate of Engineering will survey the customer on the quality of design in meeting his requirements. Positive responses will mean that we have met the customer's requirements and have met his expectations. Negative feedback is indicative of our failure to meet customer needs and expectations.

(b) Customer Feedback after product use. Sometime after the user has occupied a facility or used the service, the customer should be asked to provide feedback on the functional, operational, and technical adequacy of the product. This will identify problem areas in the QA system. This information is fed into the lessons learned system.

2-11. CHECKPOINTS AND QUALITY CONTROL PROCEDURES

Appended to this plan are the quality control procedures used by Engineering Directorate to maintain the flow of information and implement the appropriate approval controls necessary to incorporate quality assurance into a program or project. Procedures in Appendix B through P are standard for Engineering Directorate. These procedures will be incorporated into the DQCP by reference where they are applicable and sufficient. When different or more stringent requirements exist, a documented procedure will be incorporated into each DQCP.

CHAPTER 3

DESIGN QUALITY CONTROL PLAN (DQCP)

3-1. GENERAL

The Design Quality Control Plan is the project-specific management plan. This plan describes the way in which the particular design organization will produce the specific work. There are many important components to a DQCP. In most situations, many of the quality enhancing requirements are similar regardless of the type or size of a given project or task. For that reason, the development of a project-specific DQCP can reference generic components such as management philosophy, management approach, responsibilities, verification tools, and QA procedures as defined in the QCP. Project-specific requirements such as scheduling, cost control, resource utilization, reviews, value engineering, team members names, and any special or unique requirements must be established in the DQCP. For in-house work, an additional element covering the control of all in-house costs will be added. Contractors must also define the organizational management philosophy, structure, systems, and methods used to ensure quality. As a minimum, each DQCP will include the requirements outlined in appendix C of ER 1110-1-12. A DQCP will be prepared for all HNC products or services whether the work is accomplished by in-house personnel or by contract. The DQCP will be prepared and implemented in accordance with other chapters of this document, referenced regulations and guidance, and the guidance found in this chapter.

3-2. RESPONSIBILITY

For both in-house and contractor designs, the TM is responsible for preparing the DQCP as early in the design process as possible. Generally, the plan will be prepared before the pre-design conference and after the scope of the project and the criteria have been defined by the client and design team. **The TM is also responsible for securing all member and approval signatures on the DQCP prior to start of design.**

a. For in-house designs, the TM will submit the DQCP to the Chief of Design for approval before the DQCP is included into the Project Management Plan.

b. For contracts, the TM is responsible for ensuring that the contractor's QCP is submitted to the appropriate disciplines for review and for submitting all review comments to the PM for processing. After all agreed upon comments are incorporated by the contractor, the QCP will be incorporated into the DQCP by the TM and submitted to the Chief of Design for approval.

3-3. MANAGEMENT AND DESIGN TEAM STRUCTURE

The DQCP will list the organizational composition of the design team including consultants, subcontractors, etc. The organizational chart will identify, by name, managers for both ED and PM, supervisors, designers for each discipline and review team members, and their responsibilities related to the project will be included.

3-4. SCHEDULING

At the conclusion of the predesign conference, a detailed schedule showing the sequence of events in carrying out specific tasks will be completed and submitted to the Chief of Design for approval. The schedule will, as a minimum, include deliverable submittal dates, scheduled reviews by name and dates for each phase of the project, the quantity of each submittal, and the name and address of the organization to receive each submittal. The schedule will be approved and agreed to by all parties. This ensures that all parties are involved in the scheduling process.

3-5. DESIGN COST/CONTROL

Following the predesign conference, the overall design cost of the project will be prepared. The TM, in coordination with each design team member, will prepare any in-house design budgets. The TM and the Chief of Design, in coordination with the branch chiefs, will analyze the estimate and submit the agreed upon budget to the Project Manager. Each Branch Chief will monitor the work progress to ensure the level of work effort matches expenditures and that the remaining funds will cover the remaining work. The TM will, in coordination with the team member/branch chief, track overall expenditures to ensure the level of work is on track with project funding and schedules. **The Branch Chief will inform the TM when expenditures have reached 75% of the programmed amount.** When expenditures reach 75% of the programmed amount, the TM will call for a status review to ensure the projected cost to complete the project will be met. The TM should report to the Chief of Design and PM through periodic progress reports, either oral or written, the status of the task. These may include regular expenditure reports, and drawing and specification progress summaries showing percent completion. For contract work, the contractor will be required to submit these types of reports in writing to the Chief of Design and the PM. Producing a quality product can only be attained if the budget and schedules are met. The DQCP will address cost control measures.

3-6. DESIGN CRITERIA

Design criteria development is a coordinated effort between the user and the design team. Project criteria will be developed, including VE reviews and schedule reviews, as early in the planning process as possible. The criteria will be definitized and approved prior to the start of design to avoid lost effort. To achieve a higher confidence level in project criteria, a senior architect or engineer should conduct a review of the appropriate design directives and the scope of work prior to starting design to ensure that the design parameters necessary to define the project are properly identified and presented, and that mandatory design criteria (such as codes and standards) will be used. When necessary, reviewers should attend the predesign conference (or conferences during design period) to discuss the design approach with the designer. The TM will include in the DQCP all appropriate checkpoints from those shown in appendixes B through P.

3-7. DESIGN REVIEWS

An independent review of the designer's effort will be performed to enhance the quality of the product or service. This review is not intended to be a detailed check of the designer's work. The detailed design check is the responsibility of the designer. The level of reviews will be determined by the Chief of Design and the TM. Each project must be evaluated on a case-by-case basis. Complexity, size, and available funds are important considerations in determining the types and number of reviews. Most in-house design reviews will be scheduled per the HNC Design Manual.

For contracted services, scheduling of reviews will be the same criteria as in-house work. Design reviews will be properly scheduled and included in the DQCP.

3-8. CHECKLISTS

Checklists are powerful tools for design reviewers. The TM and project team are encouraged to develop an appropriate checklist from standard checklists that may be available. (Samples are provided in ER 1110-1-12, appendix H.) When checklists are developed or chosen for the project or program, they will be specified in the DQCP

3-9. VALUE ENGINEERING

Public Law 104-106 (February 1996) requires that all Federal agencies perform value engineering (VE). OMB Circular No. A-131 (May 93) further defines the requirement to require VE on all projects more than \$1 million. Prior to the predesign conference, the TM and the VE office will determine the VE requirements. These requirements will be discussed with the customer at the predesign conference. If a VE study is necessary, the technical manager, project manager, and the HNC value engineer will determine when the VE study must be completed. Generally, the VE study should be conducted at or prior to 35% design. The customer may elect not to have HNC perform the required VE studies. This response must be in writing and will serve as the documentation for a waiver. The technical manager will notify the Director of Engineering before initiating design if the study has not been performed or if the waiver letter has not been received. The Director of Engineering will notify the Chief of Project Management that the design will not proceed beyond a specified date unless either a VE study is performed or the waiver letter is received in the VE office.

3-10. QUALITY MEASUREMENTS

It is essential that we measure quality throughout the entire project delivery process. To realize a positive method of quality measurement, we will solicit customer feedback from within HNC and from external sources. Branch chiefs will use the number of significant review comments to measure the designer's attention or lack of attention to basic design parameters. This is most significant near the end of design. Design reviewers will appraise the design and submit their appraisal upon completion to the TM at the 90 percent review. Cost and time growth will also be used as a measurement of the designer's ability to manage his(her) work within assigned design dollars. The specific quality measurement tool chosen or specifically developed for a project or program will be included in the DQCP.

3-11. CONTENTS OF TYPICAL PLAN

Because most of the information followed in the Quality Assurance Program is the same regardless of the product or service, the information in the other chapters can be referenced in the DQCP. The DQCP shall state what cost estimates are required to support the design. The DQCP must be signed by all personnel on the signatory sheet prior to design start (unless a waiver is obtained from the Director, Engineering Directorate); the TM must also sign the DQCP. Any special requirements or project-specific deviations for the reference issues can be added to the DQCP. All CEHNC 1110-1-17 procedures must be included or excepted formally in the DQCP. An example DQCP is an enclosure to this chapter.

3-12. DQCP Control.

All DQCP's will have an official CEHNC control number. This number must be obtained from the Chief of Design prior to DQCP use.

EXAMPLE DESIGN QUALITY CONTROL PLAN

DESIGN QUALITY CONTROL PLAN

Conforming Storage Facility

Marine Corps Air Station Cherry Point, North Carolina

Project FY 97, Project Number CHE-98

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A. GENERAL. This document presents the Design Quality Control Plan (DQCP) for the Conforming Storage Facility located at Marine Corps Air Station, Cherry Point, N. Carolina designed by the U.S. Army Engineering and Support Center, Huntsville.

B. SCOPE OF SERVICE. The scope of services consist of all design services necessary for the preparation of contract plans and specifications, supporting design analyses, design calculations, costs estimates, value engineering, special studies, etc.

C. PROJECT SCOPE OF WORK. The Conforming Storage Facility will be a 8,000 SF CMU building in addition to a 1600 SF Administrative Support Facility. The facility will contain hazardous property in nine 600 SF storage modules. It will also contain a load/unload pad, utilities, fencing and site paving to an access road.

D. PROJECT MANAGER. The project manager for this project is Marshall Greene, phone 5-1464, unless otherwise notified. The Project Management Team consists of the following personnel:

Base Project Manager:	Hugh Burton
Design Manager:	Paul Bartz
User Project Manager:	Paul Bartz
Atlantic Division:	Tim Osborne

E. SCHEDULE:

ACTIVITY	DATE
Receive Design Instruction.....	8 Mar 96
Receive Notice to Proceed (NTP).....	9 Apr 96
Deliver Arch Plans to disciplines.....	15 Mar 96
Start Final Design.....	11 Apr 96

DQCP (continued)

Receive Preliminary Specifications.....	19 Apr 96
Submit changes to Specifications.....	1 May 96
Receive topo/planimetric from DPW.....	22 Apr 96
Submit Preliminary Final Design to Arch.....	19 Jun 96
Internal Review.....	20 Jun 96
Submit Final Final Design to Arch.....	25 Jun 96
Reproduction of Final Design.....	26 Jun 96
Begin In-House Technical Review (ITR).....	28 Jun 96
Receive Technical Review comments.....	3 Jul 96
Start Corrections to Final Design.....	8 Jul 96
Final Design Due to Arch.....	29 Jul 96
Complete Reproduction.....	5 Aug 96
Mail Out Final Design.....	9 Aug 96

F. MEETINGS. The following meetings will be attended by the design disciplines indicated:

1. Initial Design Review meeting at US Army Engineering and Support Center, Huntsville attended by Marshall Greene, Robert Huie, Patricia Hensley, Bill Strong, Tommy Hunt, Charles Barker, and Sheron Belcher.

2. **Final design (approximately 90%)** review conference at US Army Engineering and Support Center, Huntsville attended by the design team.

G. MEETINGS MINUTES. The technical manager will be responsible for the official minutes of all meetings which take place after the design review. Copies of the official minutes will be distributed to attendees by the technical manager within one week after all such meetings.

H. DESIGN TEAM. The following personnel will compose the design team. Any changes in the team shall be brought to the attention of the project manager.

Technical Manager.....	Robert Huie, ED-CS-A
Civil Design.....	Tommy Hunt, ED-CS-D
Architectural Design.....	Patricia Hensley, ED-CS-A
Structural Design.....	Charles Barker, ED-CS-S
Mechanical Design.....	Sandy Woods, ED-ME-M
Electrical Design.....	Bill Strong, ED-ME-E
Instrumentation.....	Mike Eisenzimmer ED-ME-I
Specifications.....	Sheron Belcher, ED-ES-P
Environmental.....	Ellis Gilliland, ED-CS-P

I. Q/C Procedures: For this project, the design team will be governed by the QC procedures noted in the following matrix:

DQCP (continued)

Q/C Procedure	Yes	No	Special Comments
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
Other			

DQCP (continued)

SIGNATURE BLOCKS OF PREPARERS

CIVIL TEAM MEMBER_____
BRANCH CHIEF_____
ARCHITECTURE TEAM MEMBER_____
BRANCH CHIEF_____
STRUCTURAL TEAM MEMBER_____
BRANCH CHIEF_____
MECHANICAL TEAM MEMBER_____
BRANCH CHIEF_____
ENVIRONMENTAL MEMBER_____
BRANCH CHIEF_____
INSTRUMENTATION MEMBER_____
BRANCH CHIEF_____
VALUE ENGINEER OFFICER_____
BRANCH CHIEF_____
ELECTRICAL TEAM MEMBER_____
BRANCH CHIEF_____
SPECIFICATION MEMBER_____
BRANCH CHIEF_____
TECHNICAL MANAGER_____
CHIEF OF DESIGN_____
PROJECT MANAGEMENT

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11 February 1997

APPENDIX A
REFERENCES

APPENDIX A

REFERENCES

Section I: Publications

- AR 5-1 Army Management Philosophy
- AR 25-3 Army Life Cycle Management of Information Systems
- AR 25-30 The Army Integrated Publishing and Printing Program
- AR 25-400-2 The Modern Army Record keeping System
- AR 70-1 Army Acquisition Policy
- AR 200-1 Environmental Protection and Enhancement
- AR 200-2 Environmental Effects of Army Actions
- AR 415-15 Army Military Construction, (MCA) Program Development and Execution
- Architectural and Engineering Instructions: Design Criteria (HQUSACE)
- Guide for Architect Engineer Firms Performing Services for the Atlantic Division (NAVFAC)
- CEHNC-OE, Memorandum, dated 27 December 1944, Subject: Quality Management for Ordnance and Explosive Waste
- CEHNC-SI, Publication, Standard Operating Procedure (SOP) Life Cycle Management of Automated Information Systems (AIS) (Draft)
- CEHND 1110-1-1, Design Manual, Engineering Guidance for Architect-Engineers
- CEHND 1110-1-20, Standing Operating Procedure (SOP) for the Development of In-House Designs
- CEHND 1115-3-80, Chemical Stockpile Disposal Program (CSDP) Configuration Management Plan
- CEHND-DE, Memorandum, dated 23 October 1987, subject: Change in Responsible FOA During Execution, General Officer Policy/Guidance Memorandum No. 87-18
- CEHND-ED-SY, Memorandum, dated 19 January 1993, subject: CEHND-ED-SY Standard Operating Procedures for Configuration Management
- CEHNDP 1115-1-2, Standing Operating Procedure for Criteria Development
- CEPR-P, Memorandum, dated 26 April 1988, subject: Acquisition Planning
- Chief's Policy Letter No. 26, dated 26 February 1988

CEHNC 1110-1-17

Code of Federal Regulations, Title 40, Protection of the Environment

DA PAM 310-20, Administrative Publications: Action Officers Guide

DA PAM, Leadership for Total Army Quality

DNA 4100.35, Integrated Logistics Support for DOD Systems and Equipment

DOD HCI Style Guide, Version 1-20

EM 385-1-1 Safety and Health Requirements Manual

EP 1110-1-8 Construction Equipment Ownership and Operating Expense Schedule

ER 1-1-6 Transfer of Missions and Functions Providing and Obtaining Support Services

ER 10-1-22 U.S. Army Engineer Division, Huntsville: Organization and Functions

ER 415-1-11 Biddability, Constructibility, Operability, Environmental

ER 1110-1-12 Engineering and Design Quality Management

ER 1110-1-263 Chemical Data Quality Management for Hazardous Waste Remedial Activities

ER 1110-1-1300 Cost Engineering Policy and General Requirements

ER 1110-1-8153 Ordnance Response

ER 1110-2-1200 Drawings and Specifications

ER 1110-3-109 Corps-wide Centers of Expertise

ER 1110-3-1300 Military Programs Cost Engineering

ER 1110-3-1301 Cost Engineering Policy and General Requirements for HTRW Remedial
Action Cost Estimates

ER 1110-345-100 Design Policy for Military Construction

ER 1110-345-700 Design Analysis

ER 1110-345-710 Drawings

ER 1110-345-720 Construction Specifications

ER 1180-1-9 Design-Build Contracting

FAR 31.105 Construction and Architect-Engineer Contracts

FAR 36.203 Government Estimate of Construction Costs

HNC Design Quality Management Plan (Draft)

HNDM 1110-1-1 Engineering Guidance Design Manual for Architect-Engineers

HNDP 1110-1-2 Design Review Checklist

HNDR 1-1-6 Assignment/Transfer of Missions and Functions

HNDR 715-1-10 Acquisition Planning

Metric Translation Guides (ASTM E 380, Use of International System of Units)

Test Methods for Evaluation of Solid Wastes, EPA Publication No. SW846, November 1986

TM 5-800-2 Cost Estimates: Military Construction

TM 5-800-3 Project Development Brochure

TM 5-803-1 thru 14, Planning Series

TM 55-820-1 thru 9, Drainage

TM 5-822-2 thru 14, Pavement Design

TM 5-850-2 Railroads

Section II: Forms

CEHND Form 7 Design Review Comments

CEHND Form 97 Shop Drawing Log

CEHND Form 124 Review of Shop Drawings and/or Equipment

CEHND Form 431 Drawing Sign-Out Log for NASA, Postal, AMC & GP Retrofit Drawings

CEHND Form 890 Project Review Sheet

CEHND Form 893 Disposition of Information/Data Form

DA Form 1222R Routing Slip

DD Form 1391 Military Construction Project Data

ENG Form 4025 Transmittal of Shop Drawings

HND Form 637 Shop Drawing Reproduction & Tracking Form

APPENDIX B

QC PROCEDURE NO. 1--DOCUMENT CONTROL

APPENDIX B

QC PROCEDURE NO. 1--DOCUMENT CONTROL

B-1. PRODUCT. Control of documents.

B-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities required to ensure that engineering products (drawings, design analyses, shop drawings, criteria, etc.) are properly stored and strictly controlled. This procedure is applicable to all documents produced in-house and to those produced by A-E firms under contract to USAESCH.

B-3. REFERENCES. Service Branch standard procedures.

B-4. RESPONSIBILITIES.

a. Project managers are responsible for providing clear and concise instructions concerning the disposition of all documents controlled by the Service Branch.

b. The chief of the Service Branch is responsible for ensuring that the appropriate revision level of each document is being maintained by the Service Branch and that the issuance of documents is being properly controlled.

c. Service Branch engineering technicians are responsible for ensuring that all documents are properly logged, stored, issued, returned, and destroyed or placed in records holding.

B-5. PROCEDURE.

a. Design Review Documents.

(1) All design review documents that are to be stored and controlled by the Service Branch are received from the responsible project manager via a cover memorandum. A review of the memorandum and the attached documents is made by Service Branch technician to ensure that all documents referenced by the memorandum have been received and that all pertinent information appears on the memorandum. Any questionable items are coordinated with the originating project manager or the appropriate branch chief. The memorandum is stored in a permanent file.

(2) When a review is requested by the project manager, the Service Branch is responsible for transmitting a reproduced document package that is complete and of high quality to the appropriate engineering branches. This is accomplished by attaching a cover memorandum (CEHND Form 893). Prior to transmittal, the Service Branch reviews the package to ensure that all drawings on the index sheet(s) are accounted for and that the reproduction is of good quality. If time, quantity of documents, or other restraints make it impracticable for copies to be made, then the cover memorandum is annotated to notify the engineering branches that the original documents are available for checkout from the Service Branch's repository. Project managers may also request that an information copy be sent to a branch.

(3) Unclassified documents are checked out from the Service Branch via a checkout sheet. This sheet contains a description of the document, the date when the document was checked out, and the signature of the person who received the document. The sheet is retained in a file until the document is returned. The file is closely monitored to ensure that the document is returned in a timely manner to allow all reviewers adequate time for checkout. When the document is returned, the sheet is destroyed. For classified documents, a sign-out log, signed (QC Checkpoint 1-1) by the reviewing person, is maintained by the Service Branch. This is a permanent record that is retained by the Service Branch.

(4) For unclassified documents that require review, a memorandum (CEHND Form 893) is written and signed (QC Checkpoint 1-2) by the Service Branch Projects Unit personnel, and a control number is assigned to the memorandum for control and tracking purposes. The original or copy of the documents, whether they are sent out for review or not, is sent to the Service Branch's repository personnel for retention by the Service Branch for checkout. A file locator is assigned to the documents, and they are placed in the file, along with a memorandum for each document. The documents are retained in the file until they are destroyed, either as the result of their being superseded or upon request by the applicable project manager.

(5) The applicable division's secretary and the applicable technical branch's secretary monitor the suspense date for each review or in-house design activity. If the suspense date cannot be met, the project engineer contacts the project manager to request an extension. The project manager notifies the Service Branch of the revised suspense date, and the Service Branch (by means of a revised CEHND Form 893) notifies the technical branch of the new suspense date.

(6) When all review comments or in-house design products have been received from the appropriate technical branches, through their respective divisions, the Service Branch forwards them to the appropriate project manager.

(7) Only the latest revision of each document is retained by the Service Branch unless the project manager requests retention of superseded documents for an historical file. Normally, whenever a new revision of a document is received, the superseded document is automatically destroyed. Only the latest revision of a document is issued for checkout requests.

b. Shop Drawing Review Process (Chem Demil Typical).

(1) The Service Branch receives the shop drawing package from the site contractor, time stamps it, and fills out the applicable parts of the site transmittal form including hour, day, month, and year of arrival in the Service Branch. It is evaluated for adherence to contract requirements (including completed ENG Form 4025). Correct entries on the site form are verified. Service Branch personnel will contact the site contractor if the shop drawing package is not complete. A determination is made as to which technical branch(es) will review the submittal using the Construction Specification Institute (CSI) index for the contract. The package, including a copy of the ENG Form 4025 and a DA Form 1222, is then logged into the shop drawing data base with a review completion date (QC Checkpoint 1-3) and then hand-carried to the appropriate technical branch(es) for review.

(2) The reviewing technical branch chief has the shop drawing package logged in and assigns it to a reviewing engineer/architect who makes a comprehensive technical review of the shop drawing submittal and prepares a CEHND Form 7, Design Review Comments, package and initials the site form. The action code for the submittal is entered on the CEHND Form 7 and a copy of the ENG Form 4025 (if action code A is used, no CEHND Form 124 is prepared). The CEHND Form 7, if prepared, and routing slip DA Form 1222 are initialed by the reviewing engineer (QC Checkpoint 1-4).

(3) The branch chief reviews the CEHND Form 7 comments package to ensure that a high-quality review has been made and initials the CEHND Form 7 and the site form (QC Checkpoint 1-5). The package is then logged out and returned to the Service Branch.

(4) Once the reviewed shop drawing package submittal is returned to the Service Branch personnel, the outgoing transmittal process begins. The DA Form 1222 is initialed by the Service Branch personnel, and the time and date received are annotated on the slip as well as in the log book. The returned transmittal is inventoried to ensure that all documents were properly returned and that the CEHND Form 7 is properly completed with an action code with the site form properly initialed. The CEHND Form 7 is reviewed to ensure that comments are consistent with the assigned action code with the site form properly filled in. When action codes are assigned, the original ENG Form 4025 will be annotated to request final disposition. If approval cannot be satisfied and a resubmittal is therefore required, the contractor will resubmit in the same manner as for a new submittal, except that Alpha codes will be added (e.g., No. 1 becomes 1A, B, etc.). Time and date of review completion are written on the site form (QC Checkpoint 1-6).

(5) The time and date of the reproduction of the review documents per contract requirements and, when applicable for resubmittal purposes, is noted on HND Form 637, and the quantity and quality of the reproduction is checked prior to packaging for transmittal (QC Checkpoint 1-7). Prior to submitting the final packages to the mailroom for mailing, the shop drawing package is logged out by annotating the mail-out date and final action code. One complete set of the transmittal package is retained for use as the CEHNC file copy, and the remaining packages are delivered to the mailroom for mailing.

(6) The Service Branch file copy is placed in an 8 1/2- by 11-inch folder and filed in transmittal number sequence as noted in the log book (QC Checkpoint 1-8). Comment forms and transmittal forms will be bound with drawings and other data. The routing slip, ENG Form 4025, and reproduction request, if any, will be stapled together and remain in the file for future checkout of the transmittal. Transmittal checkout will be accomplished using CEHND Form 431, completed in detail including description of data.

c. CADD Tapes.

(1) Even though the record copy of the finally approved construction package is the hard copy, any design developed on the CADD system will have a backup CADD tape which is identical to the record hard copy. This tape is stored in the CADD room and controlled by the project manager through the Service Branch. Once the tape is created, the Architectural Branch

will notify the project manager. (See paragraph C-5i below for instructions for the creation of this tape.) The CADD tape is prepared along with the ink mylars and is filed and controlled in the same manner as is the record copy.

(2) No change will be made to the record copy or the CADD backup tape without written instructions from the Service Branch per the project manager. As with the record hard copies, once amendments and changes are approved, the CADD tape is loaded onto the system. The Service Branch, per direction from the project manager and in coordination with the CADD manager, will instruct the CADD room personnel to load the tape. The CADD tape copy will become the prior condition CADD tape. Once the changes are made and a new drawing is created, a new CADD baseline tape will be created in the same manner as was the original tape.

B-6. DOCUMENTATION. Memorandums for all documents received by the Service Branch are retained in a permanent file. This file indicates the history of each document. The originals of all design products, whether produced in-house or by an A-E firm, are stored by the Service Branch, either in the active or inactive files.

APPENDIX C

QC PROCEDURE NO. 2--ENGINEERING DESIGN DOCUMENTS

APPENDIX C

QC PROCEDURE NO. 2--ENGINEERING DESIGN DOCUMENTS

C-1. PRODUCT. Engineering drawings, design analyses, design calculations, specifications, scopes of work, shop drawing reviews, concept and final designs, life cycle cost analyses (LCCA), and associated special studies.

C-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities required to ensure that all design products are properly controlled, are of high quality, and meet or exceed user requirements. This procedure is applicable to design activities performed in-house and to those performed by A-E firms under contract to USAESCH.

C-3. REFERENCES.

- a. Applicable technical publications, codes, industry standards, and Federal regulations.
- b. Architectural and Engineering Instructions: Design Criteria.
- c. CEHND 1110-1-20, Standing Operating Procedure (SOP) for the Development of In-House Designs.
- d. ER 1110-1-12, Engineering and Design Quality Management.
- e. ER 1110-345-100, Design Policy for Military Construction.
- f. ER 1110-345-720, Construction Specifications.
- g. HNDEM 1110-1-1, Engineering Guidance Design Manual for Architect-Engineers.

C-4. RESPONSIBILITIES.

a. The Chief of Design is responsible to the Director of Engineering for the technical adequacy of all design work and has overall responsibility for technical coordination and completion of all design projects. This QA role is maintained through close liaison and interface with project managers, division chiefs, branch chiefs, and project technical managers. The development of high-quality products is accomplished by ensuring that the proper QC procedures are in place and working to ensure design adequacy. The Chief of Design's primary goal is that a high-quality product be produced within budget and on schedule.

b. The division chief is responsible for ensuring that all design products produced by his or her division or for USAESCH by A-E firms are of high quality and meet all requirements imposed on them. He or she is responsible for monitoring this QC procedure to ensure proper implementation for achieving a high-quality product.

c. The branch chief is responsible for ensuring that the work is assigned to the appropriate engineer, ensuring that the work schedule is realistic and does not conflict with ongoing projects within the branch, ensuring that the proper internal QC procedures are followed, ensuring that the design meets the standards established for the project (sketch, preliminary, conceptual, and/or final), ensuring that suspenses are assigned and met, and reviewing all work performed within the branch prior to its leaving the branch.

d. The technical manager is responsible for coordinating all technical interfaces. (S)He will ensure that all necessary technical input is forthcoming and that all interdisciplinary coordination is complete and accomplished in a timely manner.

e. The senior engineer is responsible for ensuring that the project engineer fully understands the scope of the project prior to commencing work, ensuring that the designer is aware of the suspense and reports any schedule problems immediately, reviewing all work to ensure that the technical presentation satisfies all functional and special requirements of the user and is in compliance with applicable codes and standards and with sound engineering practice, and ensuring that the products produced in-house are reviewed internally prior to their being submitted to the supervisor.

f. The project engineer is responsible for ensuring that instructions, criteria, and data are complete and totally understood; ensuring that the technical manager/branch chief is notified concerning any interdisciplinary problems; ensuring that conflicts in criteria, schedules, or guidance are either quickly resolved or brought to the attention of the appropriate senior engineer or supervisor; reviewing the in-house work done by others; and reviewing his or her own work to ensure a high-quality product.

g. The specifications engineer (Programs/Projects Specifications Branch) is responsible for working with the project engineer to ensure that all technical data incorporated into the specifications and scopes of work are accurate and applicable. He or she is also responsible for working with the project engineer, the project manager, and Directorate of Public Works (DPW) installation personnel to prepare the administrative portion (Division 1) of the specifications package.

h. The project checker is responsible for reviewing the design product(s) produced by another engineer in the same design branch to ensure the adequacy of the in-house design.

i. The independent technical review team is responsible for reviewing the construction bid package, that has been prepared in-house, to ensure that all requirements (design criteria; environmental regulations; Federal, state, and local regulations; etc.) have been met and that there are no interface conflicts among disciplines.

C-5. PROCEDURE.

a. Project managers task the appropriate design branches, through the Service Branch, to perform in-house design activities or review design products produced by an A-E firm. The project manager ensures that all information needed to perform the assigned task accompanies the tasking memorandum.

b. The Service Branch logs in the tasking memorandum, assigns a control number, and distributes the memorandum to all divisions involved with the activity. The Service Branch, as indicated in appendix B, also distributes shop drawings to all divisions involved.

c. The memorandum is logged into the division and distributed by the Service Branch to the applicable branch(es).

d. The branch chief (usually through the branch secretary) logs the suspense into the branch, then assigns the task either to a project engineer or to a senior engineer who then assigns it to a project engineer. The exact routing depends on the organization of the branch.

e. For tasks involving the review of an A-E firm's work, the following procedure will be followed.

(1) The project engineer makes a comprehensive review of the A-E firm's submittal, in accordance with the branch's standard procedures and the applicable checklist(s) in HNBP 1110-1-2, and prepares a CEHND Form 7 comments package. The package is initialed (QC Checkpoint 2-1) by the project engineer and forwarded either to the senior engineer or to the branch chief, depending on the organization of the branch. The CEHND Form 7 comments and the checklist(s), as applicable, will serve as documentation for this activity.

(2) The senior engineer, as applicable, will review the CEHND Form 7 comments package and check it for the project engineer's initials. When his or her review is complete, the senior engineer will initial (QC Checkpoint 2-2) the package and forward it to the branch chief.

(3) The branch chief will review the CEHND Form 7 comments package to ensure that a high-quality review has been made and initial (QC Checkpoint 2-3) the package.

(4) The division chief will review the comments package to ensure that all reviews have been made, sign (QC Checkpoint 2-4) a transmittal memorandum when he or she is satisfied with the package, and forward the package to the Service Branch.

(5) The Service Branch will log in the comments package and forward it to the Directorate of Programs and Project Management.

(6) Upon completion of the review conference, the project manager will provide annotated actions back to the reviewers on their comments. Routing will be through the Service Branch and normal channels.

f. For tasks involving in-house design activities during the concept, intermediate (if applicable), and final design phases the following procedure will be followed.

(1) The project engineer produces the design product(s) in accordance with the design requirements and applicable design guides (e.g., HNBP 1110-1-1 and CEHND 1110-1-20). Prior to finalizing his or her design, the project engineer will check his or her work to ensure that the design is complete, that it meets all design requirements, and that it has been prepared consistent with applicable codes and standards and using sound professional principles and practices. After the completion of the review and any corrections resulting from the review, the project engineer will sign off on the product(s). For design drawings, this will be accomplished by

initialing the drawings in the "designed by" block on the title block. (Refer to figure C-1.) The drafter will also initial the drawings to signify that the drawings are in accordance with drafting standards. For specifications, design analyses, and design calculations, the project engineer will initial the upper left-hand corner of the document to signify that the QC review was completed. All reviews will be dated. Special studies will have a sign off sheet for all reviewers to sign and date.

(2) Depending on the level of experience of the designer and the complexity of the design, another engineer in the branch may review the design as the project checker. In most cases, this function will be performed by the senior engineer or the branch chief. This review will use the applicable checklists in HNBP 1110-1-2 as a guide for his or her review and will submit his or her comments to the designer. If there are comments that cannot be resolved by the designer, they will be referred either to the senior engineer or to the branch chief. After resolution of these comments by the designer and incorporation of applicable comments into the documents, the project checker will sign off (initial and date (QC Checkpoint 2-5)) on the documents. Documentation for the project checker consists of the comments package, design checklists (as applicable), and sign off (in the "checked by" block on the drawings) of the documents.

(3) When applicable, the senior engineer reviews the work of the project engineer after the project checker has signed off on the documents. The senior engineer reviews the work for design adequacy, high quality, resolution of the project checker's comments, and proper documentation of reviews. The senior engineer initials and dates (QC Checkpoint 2-6) the appropriate documents to indicate his or her approval of the work. This function may be performed by the branch chief.

(4) The branch chief makes the final review of all design activities performed by his or her branch. The branch chief reviews the drawings for completeness, high quality, and adherence to this QC procedure (all previous QC checks have been performed and documented). The branch chief's verification of the concept, intermediate (if applicable), and final design packages is accomplished by his or her initializing the memorandum used to transmit the package in response to the tasking. The branch chief's verification of the final design package is accomplished by his or her signing and dating (QC Checkpoint 2-7) the drawings in the "submitted by" block on each drawing title block and initialing and dating (QC Checkpoint 2-8) the other design products.

(5) Drawings, volume 1 of the design analyses, calculations, and special studies are forwarded to the Architectural Branch at the completion of each design phase. Prior to the completion of the final design phase, marked up Corps of Engineers guide specifications (CEGS) and newly developed project specifications are forwarded to the Programs/Projects Specification Branch for review and finalization.

(6) The Architectural Branch assembles the review package, which consists of drawings, volume 1 of the design analyses) and special studies. This package is then sent to the Service Branch, where specifications (assembled by the Programs/Projects Specifications Branch) are incorporated into the review package. The complete review package is processed in accordance with the project manager's instructions. This normally involves distribution for an in-house review, a constructibility review by the major subordinate command (MSC)/district, and a functional adequacy review and authentication (at the 35-percent concept design phase) by the user.

(7) Comments received from the various reviewers are resolved by the designer and incorporated, as applicable, into the design. The designer annotates the comments to indicate the action taken on each comment. The comments package is initialed (QC Checkpoint 2-9) by the designer and forwarded to the senior engineer and the branch chief for their review and concurrence (QC Checkpoints 2-10 and 2-11, respectively) in the same manner as indicated in paragraphs e(2) and e(3) above.

g. The procedure for ensuring the development of high-quality specifications is indicated below.

(1) A specifications engineer reviews the marked up CEGS and the new specifications developed for the project to ensure compliance with current criteria, policies, and changes in the state of the art; the accuracy of each sentence and paragraph of the specifications; and that an item is specified only once in the specifications package. The specifications are reviewed in accordance with ER 1110-345-720 and the specifications checklist in HNPD 1110-1-2. The checklist serves as documentation for this review. The specifications engineer will prepare and initial (QC Checkpoint 2-12) a CEHND Form 7 comments package which documents any errors and discrepancies. The Programs/Projects Specifications Branch Chief will review and initial (QC Checkpoint 2-13) the comments package and forward it, via the project manager, to the designer. After the designer has made the necessary changes to the specifications and the specifications engineer is satisfied with the specifications package, it is forwarded to the Chief of the Programs/Projects Specifications Branch.

(2) The Programs/Projects Specification Branch Chief reviews the specifications to ensure conformance with applicable requirements and that the specifications engineer's review has been properly documented, then initials (QC Checkpoint 2-14) the draft specifications package to signify his or her concurrence. The specifications are then ready for the final review.

(3) After incorporation of applicable comments from the final review, the specifications are ready for review by the independent technical review team (see paragraph h below). After review by the independent technical review team and resolution of comments, the specifications engineer has the final processing done. After final processing, the specifications engineer ensures that the final specifications are in correct format, are clear, and are concise.

h. After the approved final design review comments have been incorporated and all other required additions and corrections have been made, the design products are forwarded to the independent technical review team. If necessary, the independent technical review may be conducted concurrent with the final review. The independent technical review team reviews all documents in the construction bid package to ensure that all design requirements have been met, ensures that the design is presented in a clear and concise manner so that the construction bid package can be properly bid, and ensures that proper coordination among disciplines has been achieved. The Branch Chief appoints a senior engineer in his or her branch to serve as a member of the review team. The independent technical reviewer must be someone who was not involved with the design, the internal design review, or the checking of the products. Although the reviewer has the authority and responsibility to review the complete package, the focus of the review should be on the reviewer's discipline and that discipline's interface with other relevant disciplines. HNPD 1110-1-2 will be used as a supplemental guide in performing the review. Review comments will be presented to the designer for resolution. After the designer has resolved the reviewer's comments and the reviewer has back checked the applicable corrections, the reviewer will sign off on the document(s). For drawings, this will consist of a signature and date (QC Checkpoint 2-15) in the reviewer block on the title block of the final drawings. Other

design products will be initialed and dated (QC Checkpoint 2-16). The design checklists (as applicable) and the annotated comments will constitute the documentation for this activity.

i. After incorporation of the independent technical review team comments, the final drawings, specifications, design analyses, design calculations, and design studies are prepared by each branch. The final drawings are initialed/signed (QC Checkpoints 2-17, 2-18, 2-19, and 2-20 respectively) by the project engineer, drafter, project checker, and branch chief. Then they are forwarded to the Architectural Branch to be assembled into the final construction bid package. As a part of the final submittal to the Architectural Branch, each design branch will submit (on an 8-1/2- by 11-inch sheet of paper) the CADD directory and design file names for each drawing. The Architectural Branch will create a baseline CADD tape to be stored in the main computer room. Revisions to the CADD tape will be accomplished only under the direction of the project manager and in accordance with the CADD SOP. The Architectural Branch sends the index sheets to the MSC/district for approval. After receiving the signed index sheets from the MSC/district, approval is obtained from the division chiefs. The division chief's signature (QC Checkpoint 2-21) on the index sheets of the drawings package authenticates the design products of his or her division and signifies that the QC procedure has been properly implemented by his or her division. After the division chiefs have approved the drawings package, the Chief of Design, the Director of Engineering, and the HNC Commanding Officer indicate their approval by signing (QC Checkpoints 2-22, 2-23, and 2-24, respectively) the drawings package. The final drawings package is then forwarded to the Service Branch.

j. The final specifications are assembled by the specification engineer and sent to the Directorate of Contracting which adds the appropriate clauses and submits the specification package to the Office of Counsel for review (if advertised from CEHNC). After Office of Counsel approval of the final specification package, the contracting specialist sends the package for reproduction and then delivery to the mailroom for distribution.

k. The Service Branch will receive and log in the original drawings package from the Architectural Branch. After receiving instructions from the contract specialist as to the number of copies of the drawings package required for the contract, the Service Branch sends the drawing originals to reproduction. When reproduction is completed, the drawing package is forwarded to the mailroom, where the final specifications and final drawings are combined to form the contract package.

l. After receiving instructions from the contract specialist as to the number of copies of the contract package required for in-house distribution, the Service Branch makes distribution to appropriate USAESCH personnel in accordance with a listing provided by the project manager.

m. The contract specialist prepares the mailing labels for outside distribution and directs the handling of the contract packages relative to this distribution.

n. Drawing changes that require changing baselined documentation will be handled in accordance with the QC procedure for engineering change proposals (ECP's) (see appendix D).

o. For tasks involving the review of shop drawings, the following procedure will be followed.

(1) The project engineer makes a comprehensive review of the shop drawing submittal and prepares a CEHND Form 124 comments package. The action code for the submittal is entered on the CEHND Form 124 and copy of the ENG Form 4025, if action code A is used no CEHND Form 124 is prepared. The CEHND Form 124, if prepared, and routing slip DA Form 1222 are initialed by the project engineer (QC Checkpoints 2-25 and 2-26).

(2) The senior engineer, as applicable, will review the CEHND Form 124 comments package and check it for the project engineers initials. When his or her review is complete, the senior engineer will initial (QC Checkpoint 2-27) the package and forward it to the branch chief. The branch chief may perform this function.

(3) The branch chief will review the CEHND Form 124 comments package to ensure that a high-quality review has been made and initials the CEHND Form 124 and the DA Form 1222 (QC Checkpoints 2-28 and 2-29). The package is then returned to the division log in point for return to the Service Branch.

C-6. DOCUMENTATION. Documentation requirements will be as specified in paragraph C-5. A copy of the design checklists (as applicable) and the annotated review comments will be retained by the TM and filed with the project file or DQCP as permanent QA records. Originals for all design products, except specifications, will be retained by the Service Branch as permanent QA records. The final specifications originals will be retained by the Directorate of Contracting as permanent QA records.

APPENDIX D

QC PROCEDURE NO. 3--ENGINEERING CHANGE PROPOSALS (ECP's)

APPENDIX D

QC PROCEDURE NO. 3--ENGINEERING CHANGE PROPOSALS (ECP's)

D-1. PRODUCT. ECP's .

D-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities related to controlling ECP's and their quality within the Directorate of Engineering.

D-3. REFERENCES.

Program-specific configuration management plans, e.g., CEHND 1115-3-80, Chemical Stockpile Disposal Program (CSDP) Configuration Management Plan and CEHNC-ED-SY Standard Operating Procedures for Configuration Management, developed for the Directorate of Chemical Demilitarization.

D-4. RESPONSIBILITIES.

a. The Systems Engineering Division is responsible to the Director of Engineering for the coordination of all activities of the CM program within USAESCH.

b. The branch chief of each reviewing branch is responsible for ensuring that a highly qualified person is assigned for ECP reviews.

c. The branch chief of each reviewing branch is responsible for ensuring that ECP reviews are accomplished in accordance with **the QC procedures in CEHNC 1110-1-17.**

D-5. PROCEDURE.

a. The configuration management (CM) engineer receives the ECP and reviews it for completeness, then provides it to the program analyst for entry into the data base. If the ECP is determined to be incomplete, the CM engineer either returns it, via a transmittal memorandum signed (QC Checkpoint 3-1) by the Systems Engineering Division chief, to the originator with directions for resubmittal or documents the incompleteness and need for resubmittal in the minutes of the related Configuration Control Board (CCB) meeting, which are sent out via a transmittal memorandum signed (QC Checkpoint 3-2) by the Systems Engineering Division chief.

b. The CM engineer provides the ECP to the Service Branch for distribution to the technical divisions for review.

c. The CM engineer reviews the memorandum from the Service Branch to ensure that proper distribution was made. The project manager receives an information copy of the ECP, and the Directorate of Engineering technical **branches** review the ECP to evaluate the technical merits and **cost and schedule impacts** of the proposed change. The review comments are provided **to the division chief for consolidation and signature (QC Checkpoint 3-3) and then sent to** Systems Engineering Division via transmittal memorandum. The CM engineer reviews the data for completeness and coordinates incomplete data with the reviewer.

d. The CM engineer compiles the USAESCH review comments and convenes a meeting to determine the USAESCH position with respect to the ECP's on the CCB meeting agenda prior to the CCB meeting.

e. The CM engineer sends, via signed (QC Checkpoint 3-4) facsimile transmission, a copy of the USAESCH position determinations and the appropriate review comments to the CCB chairman before the CCB meeting.

f. The CM engineer prepares minutes of CCB actions and distributes the minutes of the CCB meeting to relevant MSC's/districts and USAESCH in-house personnel. The minutes are reviewed and signed (QC Checkpoint 3-5) by the Operations Branch Chief.

g. The CM engineer prepares a summary-of-CCB-actions memorandum for the Configuration Policy Board chairman, the CCB chairman, and the CCB members. This memorandum is signed (QC Checkpoint 3-6) by the Division Engineer.

h. The CM engineer provides the CCB actions to the program analyst for updating of the data base.

i. The CM engineer reviews a printout of the data base for completeness and correctness. Incomplete or incorrect printouts are marked up, initialed (QC Checkpoint 3-7) by the CM engineer, and returned to the program analyst for correction.

j. The CM engineer provides a copy of the ECP, comments, and actions to the program analyst for filing in the Operations Branch files.

D-6. DOCUMENTATION. The Systems Engineering Division develops and maintains an ECP status report by project. The Systems Engineering Division CM engineer provides a copy of the ECP, comments, and actions to the Systems Engineering Division for its ECP history file. The Systems Engineering Division manages and maintains this electronic history file data base. Reports are generated on an as-needed basis. A hard copy history file is maintained by the Operations Branch.

APPENDIX E

QC PROCEDURE NO. 4--COST ESTIMATES

APPENDIX E

QC PROCEDURE NO. 4--COST ESTIMATES

E-1. **PRODUCT.** Construction cost estimates (preliminary estimate, budget estimate, current working estimate, control estimate, independent Government estimate (IGE), DD Form 1391 estimate, and ENG Form 3086 estimate), supply cost estimates, and service contract cost estimates.

E-2. **PURPOSE/SCOPE.** This procedure describes the activities and responsibilities required to ensure that all cost estimates enumerated in paragraph E-1 are properly prepared and controlled and are high-quality products. This procedure is applicable to cost estimates prepared in-house and to those prepared by A-E firms under contract to USAESCH.

E-3. REFERENCES.

- a. AR 415-15, Military Construction, Army (MCA) Program Development.
- b. Architectural and Engineering Instructions: Design Criteria
- c. EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule.
- d. ER 1110-1-12, Engineering and Design Quality Management.
- e. ER 1110-1-1300, Cost Engineering Policy and General Requirements.
- f. ER 1110-3-1300, Military Programs Cost Engineering.
- g. ER 1110-3-1301, Cost Engineering Policy and General Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) Remedial Action Cost Estimates.
- h. FAR 31.105, Construction and Architect-Engineer Contracts.
- I. FAR 36.203, Government Estimate of Construction Costs.
- j. HNDEM 1110-1-1, Engineering Guidance Design Manual for Architect-Engineers.
- k. TM 5-800-2, Cost Estimates: Military Construction.

E-4. RESPONSIBILITIES.

a. The chief of the Cost Engineering Division is responsible for ensuring that all cost estimates produced under the direction of his or her division are of high quality given the level of design detail available. (S)He is responsible for monitoring this QC procedure to ensure proper implementation for achieving a high-quality product.

b. The chief of the Cost Engineering Branch is responsible for ensuring that all cost estimates produced by his or her branch or for USAESCH by A-E firms are high-quality products and that all QC checks have been made and properly documented.

c. The senior cost engineer is responsible for reviewing the work of the cost engineer to ensure that the cost estimates have been properly prepared, are of high quality given the level of design detail available, and are well documented.

d. The cost engineer is responsible for producing a high-quality product in accordance with applicable guides and regulations and commensurate with the level of design detail available.

e. The project checker is responsible for reviewing the cost estimate produced by another cost engineer in the same branch to ensure the accuracy and adequacy of the estimate.

E-5. PROCEDURE.

a. The applicable project manager tasks the Cost Engineering Branch, through the Service Branch, to perform in-house cost-estimating activities or to review cost estimates prepared by an A-E firm.

b. The Service Branch logs in the tasking memorandum, assigns a control number, and distributes the memorandum to the Cost Engineering Branch.

c. The memorandum is logged into the Cost Engineering Branch, and the branch chief assigns the task to a senior cost engineer who then assigns it to a cost engineer(s).

d. For tasks involving the review of an A-E firm's work, the following procedure will be followed.

(1) The cost engineer makes a comprehensive review of the A-E firm's submittal, in accordance with the applicable checklist(s) in HNBP 1110-1-2, and prepares a CEHND Form 7 comments package. The package is initialed (QC Checkpoint 4-1) by the cost engineer and forwarded to the senior cost engineer. The CEHND Form 7 comments and the checklist(s) will serve as documentation for this activity.

(2) The senior cost engineer will review the CEHND Form 7 comments package and check it for the cost engineer's initials. When his or her review is complete and he or she is satisfied with the comments, the senior cost engineer will initial (QC Checkpoint 4-2) the package and forward it to the branch chief.

(3) The branch chief will review the CEHND Form 7 comments package to ensure that a high-quality review has been made and will initial (QC Checkpoint 4-3) the package when he or she is satisfied with the review.

(4) The division chief will review the comments package to ensure that all reviews have been properly made and will initial (QC Checkpoint 4-4) the package to signify his or her acceptance of the comments. The package is forwarded to the Service Branch after it is logged out by the Cost Engineering Branch.

(5) The Service Branch will log in the comments package and forward it to the appropriate project manager.

e. The following procedure will be followed, during all phases of design, for all in-house cost-estimating activities, except the development of cost estimates via the Micro Computer-Aided Cost-Estimating System (MCACES).

(1) The cost engineer produces the required cost estimate in accordance with the applicable cost-estimating guides and regulations. Prior to finalizing his or her cost estimate, the cost engineer will check his or her work to ensure that the estimate is complete, is comprehensive in scope, is in the proper format, that applicable guides and regulations have been adhered to, and that the proper backup documentation has been developed to support the estimate. After completing the review and making any corrections necessitated by the review, the cost engineer will sign and date the document.

(2) Another cost engineer (referred to as the project checker) in the branch, who to the greatest extent possible was not involved with the cost estimate, will review the estimate. The project checker will use the applicable checklists in HNBP 1110-1-2 as a guide for his or her review. Any errors, inconsistencies, omissions, etc., will be brought to the attention of the cost engineer who prepared the estimate. After resolution of the project checker's comments by the cost engineer and incorporation of applicable comments into the estimate, the project checker will initial and date (QC Checkpoint 4-5) the document. Documentation for the project checker consists of the design checklists and sign off of the document.

(3) The senior cost engineer reviews the work of the cost engineer after the project checker has initialed and dated the estimate. (S)He reviews the work for accuracy, adequacy, comprehensiveness, high quality, appropriately documented backup, and compliance with established review procedures. When he or she concurs with the estimate, he or she will initial and date (QC Checkpoint 4-6) the document.

(4) The branch chief makes the final review of all cost-engineering activities performed by his or her branch. The branch chief reviews the cost estimate for completeness, quality, and adherence to this QC procedure (all previous QC checks have been performed and documented). The branch chief's verification of the cost estimate is accomplished by his or her initialing and dating (QC Checkpoint 4-7) the document.

(5) The division chief reviews the cost estimate document, and his or her initialing and dating (QC Checkpoint 4-8) the document authenticates the cost estimate and signifies that this QC procedure has been properly implemented for this product. The cost estimate is logged out by the Cost Engineering Branch and sent to the project manager, via the Service Branch, or directly to the contracting representative or, if request is for verbal response only, filed in the Cost Engineering Branch's files.

(6) The Service Branch will log in the cost estimate, if provided, and make distribution in accordance with the project manager's instructions.

f. The following procedure will be followed, during all phases of design, for all in-house cost-estimating activities involving the development of cost estimates via MCACES.

(1) The cost engineer produces the required cost estimate in accordance with the applicable cost-estimating guides and regulations. Prior to finalizing his or her cost estimate, the cost engineer will check his or her work to ensure that the estimate is complete, is comprehensive in scope, is in the proper format, that applicable guides and regulations have been adhered to, and that the proper backup documentation has been developed to support the estimate. After completing the review and making any corrections necessitated by the review, the cost engineer will sign and date the document.

(2) The senior cost engineer reviews the work of the cost engineer for accuracy, adequacy, comprehensiveness, high quality, appropriately documented backup, and compliance with established review procedures. When he or she concurs with the estimate, he or she will initial and date (QC Checkpoint 4-9) the document.

(3) The branch chief makes the final review of all cost-engineering activities performed by his or her branch. The branch chief reviews the cost estimate for completeness, high quality, and adherence to this QC procedure (all previous QC checks have been performed and documented). The branch chief's verification of the cost estimate is accomplished by his or her initialing and dating (QC Checkpoint 4-10) the document.

(4) The division chief reviews the cost estimate document, and his or her initialing and dating (QC Checkpoint 4-11) the document authenticates the cost estimate and signifies that this QC procedure has been properly implemented for this product. The cost estimate is logged out by the Cost Engineering Branch and sent to the project manager, via the Service Branch, or directly to the contracting representative or, if request is for verbal response only, filed in the Cost Engineering Branch's files.

(5) The Service Branch will log in the cost estimate, if provided, and make distribution in accordance with the project manager's instructions.

E-6. DOCUMENTATION. The documentation requirements will be as specified in paragraph E-5 above. The design checklists, the comments package, and the originals of the estimates will be retained by the Cost Engineering Branch, unless required to be forwarded to others. Given such a requirement, a memorandum or letter of transmittal will serve as documentation of such official transfer.

APPENDIX F

QC PROCEDURE NO. 5--DESIGN CRITERIA DOCUMENTS

APPENDIX F

QC PROCEDURE NO. 5--DESIGN CRITERIA DOCUMENTS

F-1. PRODUCT. Project Development Brochures (PDB's), design manuals, design guides, IGE's, DD Forms 1391, and statements of work (SOW's).

F-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities required to ensure that all criteria documents are properly controlled, are of high quality, and meet or exceed user requirements. This procedure is applicable to activities performed in-house and to those performed by A-E firms under contract to USAESCH.

F-3. REFERENCES.

- a. Applicable technical publications, industrial standards, and other Federal regulations.
- b. AR 415-15, Military Construction, Army (MCA) Program Development.
- c. Architectural and Engineering Instructions: Design Criteria.
- d. CEHNDP 1115-1-2, Standing Operating Procedure for Criteria Development.
- e. ER 1110-1-12, Engineering and Design Quality Management.
- f. HNDM 1110-1-1, Engineering Guidance Design Manual for Architect-Engineers.
- g. TM 5-800-3, Project Development Brochure.

F-4. RESPONSIBILITIES.

a. The Chief, Systems Engineering Division has overall responsibility for the preparation of design criteria documents. The Chief of Design has overall responsibility for the technical adequacy of the design criteria. The project manager is responsible for the scheduling and funding of the design work and for coordinating data interfaces between USAESCH and the user.

b. The division chief is responsible for ensuring that all criteria produced by his or her division or by A-E firms are of high quality and satisfy user requirements. (S)He is responsible for monitoring this procedure to ensure proper implementation for achieving a high-quality product.

c. The branch chief is responsible for ensuring that all criteria produced by his or her branch are of high quality and meet user requirements and that all QC checks have been made and properly documented.

d. The senior engineer is responsible for reviewing the work of the project engineer to ensure that user requirements have been met and that the criteria produced are of high quality.

e. The project engineer is responsible for producing a high-quality product that satisfies user requirements. Development of the criteria may require that a discipline engineer(s) and the Systems Engineering Division representative interface with the user to obtain clarification of user requirements or to assist the user in developing such requirements.

f. The systems project engineer is responsible for assembling the criteria produced by the different design disciplines into a draft criteria document, coordinating changes with the discipline engineers, and producing the final document.

F-5. PROCEDURE.

a. The project manager tasks the appropriate design branches, through the Service Branch, to produce design criteria documents in-house or to review criteria produced by an A-E firm.

b. The Service Branch logs in the tasking memorandum, assigns a control number, and distributes the memorandum to all divisions involved with the activity.

c. The memorandum is logged into the division and distributed to the applicable branch(es).

d. The branch chief assigns the task either to a project engineer or to a senior engineer who then assigns it to a project engineer. The exact routing depends on the organization of the branch.

e. For tasks involving the review of criteria documents produced by A-E firms, the following procedure will be followed.

(1) The project engineer or the systems project engineer will make a comprehensive review of the A-E firm's submittal in accordance with user requirements and the applicable documents specified in paragraph F-3 above and will prepare a CEHND Form 7 comments package. The package will be initialed (QC Checkpoints 5-1 and 5-2, respectively) by the project engineer/systems project engineer and forwarded either to the senior engineer or to the branch chief. The CEHND Form 7 comments package will serve as documentation for this activity.

(2) The senior engineer, as applicable, will review the CEHND Form 7 comments package, make a cursory review of the criteria, and check the comments package for the project engineer's/systems project engineer's initials. When his or her review is complete, the senior engineer will initial (QC Checkpoint 5-3) the comments package and forward it to the branch chief. This function may be performed by the branch chief. This function may be performed by the branch chief.

(3) The branch chief will review the comments package to ensure that a high-quality review has been made. When the branch chief is satisfied that a high-quality review has been made and properly documented, he or she will initial (QC Checkpoint 5-4) the package and forward it to the division chief for approval.

(4) The division chief will review the comments package to ensure that all reviews have been made, sign (QC Checkpoint 5-5) a transmittal memorandum when he or she is satisfied with the package, and forward the package to the Service Branch.

(5) The Service Branch will log in the comments package and forward it to the appropriate project manager.

f. The following procedure will be followed for in-house development of criteria documents, excepting the development of SOW's.

(1) A discipline engineer(s) develops the criteria for his or her discipline in accordance with user requirements and applicable documents. After completion of the criteria, the discipline engineer(s) will check his or her work to ensure completeness and that user requirements have been met. After the review has been completed and any necessary corrections have been made, the discipline engineer(s) will initial the criteria package.

(2) A senior discipline engineer will review the work of the discipline engineer for adequacy, completeness, and high quality and to ensure that the review by the developer was properly documented. The senior discipline engineer will initial (QC Checkpoint 5-6) the criteria package when he or she is satisfied with the product. This function may be performed by the branch chief.

(3) The branch chief makes the final review of the criteria produced by his or her branch. The branch chief reviews the SOW for completeness, high quality, and adherence to this procedure (all previous QC checks have been performed and properly documented). The branch chief's verification of the SOW is accomplished by his or her initialing (QC Checkpoint 5-7) the document.

(4) The division chief reviews the criteria to ensure that this QC procedure has been properly implemented. The division chief's signature (QC Checkpoint 5-8) on a transmittal memorandum signifies that this implementation has been accomplished.

(5) The criteria package is forwarded to the Service Branch, where it is logged in and sent to the Systems Engineering Division.

(6) The systems project engineer organizes and assembles the material from the different engineering disciplines into a draft criteria document. The draft criteria document is reviewed by a senior systems engineer, and both the senior systems engineer (if applicable), and the systems project engineer initial (QC Checkpoints 5-9 and 5-10, respectively) the criteria document to signify that they have reviewed the draft document.

(7) The Systems Engineering Division branch chief reviews the criteria document to ensure that it has been properly reviewed, then initials (QC Checkpoint 5-11) the document to signify his or her concurrence.

(8) The Systems Engineering Division chief reviews the document to ensure that this QC procedure has been followed. He or she signifies his or her concurrence by signing (QC Checkpoint 5-12) the transmittal memorandum, then forwards the document to the Service Branch.

(9) The Service Branch reproduces the draft document and sends it to the engineering branches for review.

(10) Each engineering branch reviews (QC Checkpoints 5-13, 5-14, 5-15, and 5-16) the draft document, following the procedure for reviewing A-E firm submittals (see paragraph e above), and sends its comments to the Service Branch.

(11) The Service Branch receives the engineering branches' comments and sends them to the Systems Engineering Division. The systems project engineer resolves any conflicts between comments with the discipline engineers, annotates the comments, and incorporates applicable comments into the draft. The Systems Engineering Division then sends the updated draft to the Service Branch via a transmittal memorandum signed (QC Checkpoint 5-17) by the division chief.

(12) The Service Branch sends the updated draft to the user for comments, receives the user review comments, and sends them to the engineering branches for review.

(13) Each engineering branch reviews the user review comments and sends its comments to the Service Branch.

(14) The Service Branch receives the engineering branches' comments and sends them and the user review comments to the Systems Engineering Division. The systems

project engineer resolves any conflicts between comments with the discipline engineers and the user, annotates the comments, and incorporates applicable comments into the updated draft. After all applicable comments have been incorporated, the final document is reviewed (QC Checkpoints 5-18, 5-19, 5-20, and 5-21) by the Systems Engineering Division in the same manner as was the draft document (see paragraphs f(6) through f(8) above). The final document is then forwarded, via the Service Branch, to the Chief of Design.

(15) The Chief of Design reviews the final document for technical adequacy, initials (QC Checkpoint 5-22) the document to indicate his or her concurrence, then forwards the document to the Service Branch.

(16) The Service Branch logs in the document, reproduces the number of copies requested by the project manager, and forwards the copies to the project manager.

g. The following procedure will be followed for the development of SOW's.

(1) A discipline engineer(s) develops the SOW in accordance with user requirements. After completion of the SOW, the discipline engineer(s) will check his or her work to ensure completeness and that user requirements have been met. After the review has been completed and any necessary corrections have been made, the discipline engineer(s) will initial the SOW.

(2) A senior discipline engineer will review the work of the discipline engineer for adequacy, completeness, and high quality and to ensure that the review by the developer was properly documented. The senior discipline engineer will initial (QC Checkpoint 5-23) the SOW when he or she is satisfied with the product. The branch chief may perform this function.

(3) The branch chief makes the final review of the SOW produced by his or her branch. The branch chief reviews the SOW for completeness, high quality, and adherence to this procedure (all previous QC checks have been performed and properly documented). The branch chief's verification of the SOW is accomplished by his or her initialing (QC Checkpoint 5-24) the document.

(4) The division chief reviews the SOW to ensure that this QC procedure has been properly implemented. The division chief's signature (QC Checkpoint 5-25) on a transmittal memorandum signifies that this implementation has been accomplished. The division chief forwards the approved SOW to the requester.

F-6. DOCUMENTATION. Copies of the annotated comments are retained by the Systems Engineering Division as permanent QA records. The originals for the document are retained by the Service Branch as permanent QA records. Copies of SOW's are maintained as temporary records by the applicable division and are destroyed periodically at the discretion of the division chief.

APPENDIX G

QC PROCEDURE NO. 6--PLANNING DOCUMENTS

APPENDIX G

QC PROCEDURE NO. 6--PLANNING DOCUMENTS

G-1. PRODUCT. Memorandums of Understanding/Agreement (MOU's/MOA's), management plans, acquisition plans, and Inventory Progress Reports (INPR's).

G-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities necessary to ensure that appropriate planning documentation is properly identified, developed, staffed, and maintained throughout the life of an assigned project/program.

G-3. REFERENCES.

a. CEHND-DE, Memorandum, dated 23 October 1987, subject: Change in Responsible FOA During Execution, General Officer Policy/Guidance Memorandum No. 87-18.

b. CEPR-P, Memorandum, dated 26 April 1988, subject: Acquisition Planning.

c. Chief's Policy Letter No. 26, dated 26 February 1988.

d. ER 1-1-6, Transfer of Missions and Functions Providing and Obtaining Support Services.

e. ER 10-1-22, U.S. Army Engineer Division, Huntsville: Organization and Functions.

f. ER 1110-1-12, Engineering and Design Quality Management

g. HNDR 1-1-6, Assignment/Transfer of Missions and Functions.

h. HNDR 715-1-10, Acquisition Planning.

G-4. RESPONSIBILITIES.

a. The project manager determines the requirement for an MOU/MOA, management plan, and/or acquisition plan in coordination with the Analysis Branch chief, supports the Systems Engineering Division in the preparation of planning documents as required, and administers the understanding/ agreement/plan with the agencies being supported.

b. The Systems Engineering Division chief is responsible for ensuring that products produced by his or her division are of high quality and are produced in accordance with this procedure.

c. The Analysis Branch chief is responsible for ensuring that the work is assigned to the appropriate senior systems engineer and that it can be accomplished within the required budget

and schedule. He or she ensures that the work is of high quality and is produced in accordance with this procedure.

d. The senior systems engineer is responsible for ensuring that the systems engineer fully understands the scope of the project prior to commencing work. He or she reviews the work for high quality and to ensure that this procedure has been followed, then submits it to the branch chief.

e. The systems engineer is responsible for ensuring that he or she fully understands all task instructions and that any situation or circumstance which could adversely affect the quality of the product is immediately brought to the attention of the senior systems engineer. The systems engineer is also responsible for reviewing his or her own work to ensure that a high-quality product is produced for submittal to the senior systems engineer.

G-5. PROCEDURE.

a. The project manager tasks the Systems Engineering Division chief, through the Service Branch, to prepare and/or update the appropriate planning document.

b. The tasking memorandum is logged into the division and distributed to the Analysis Branch chief.

c. The Analysis Branch chief assigns the work to the appropriate senior systems engineer for execution.

d. The senior systems engineer will oversee the preparation of the initial draft document, which will be prepared by a systems engineer. MOU's/MOA's and management plans will be prepared in accordance with CEHNDR 1-1-6. In addition, the preparation of MOU's/MOA's with new customers will be coordinated with the Chief, Strategic Planning and Initiatives Office. Acquisition plans will be prepared in accordance with CEHNDR 715-1-10. A memorandum requesting preliminary review comments from appropriate organizations within USAESCH will be prepared by the systems engineer. Prior to distribution of the draft document outside of the Directorate of Engineering, it will be reviewed by the senior systems engineer, the Analysis Branch chief, the Systems Engineering Division chief, and the Director of Engineering. These individuals will document their coordination by initialing and dating (QC Checkpoints 6-1, 6-2, 6-3, and 6-4, respectively) the file copy of the transmittal memorandum.

e. All management plans, MOU's/MOA's, acquisition plans, and revisions thereto will be coordinated, as a minimum, with the appropriate Directorate of Engineering personnel, the Directorate of Resource Management, the Directorate of Contracting, and the Office of Counsel. Other directorates and separate offices will be coordinated with as necessary. This coordination is necessary to ensure appropriate coverage of requirements and availability and adequacy of resources. Comments will be submitted on CEHND Form 7. Upon receipt of comments, the systems engineer will review the comments, resolve any conflicts, and dispose of each comment by entering an appropriate remark, with his or her initials (QC Checkpoint 6-5), on the CEHND Form 7.

f. Once appropriate comments have been incorporated and the document updated, a memorandum will be prepared by the systems engineer for submittal to the project manager. This memorandum, with the finalized draft document attached, will be coordinated with the senior systems engineer, the Analysis Branch chief, the Systems Engineering Division chief, and the Director of Engineering, then submitted to the appropriate project manager. The senior systems engineer, the Analysis Branch chief, the Systems Engineering Division chief, and the Director of Engineering will document their coordination by initialing and dating (QC Checkpoints 6-6, 6-7, 6-8, and 6-9, respectively) the file copy of the transmittal memorandum.

g. The project manager will prepare the formal transmittal memorandum for final staffing and signature. The project manager will provide a finalized copy of the document to the Directorate of Resource Management and to the senior systems engineer.

G-6. DOCUMENTATION. Copies of Systems Engineering Division transmittal memorandums, including review comments, will be maintained in accordance with USAESCH record- management procedures. Copies of the finalized document and the task assignment and changes thereto, along with the transmittal

memorandum, will be maintained in the USAESCH Mission Repository (Directorate of Resource Management, Management Analysis Division).

APPENDIX H

QC PROCEDURE NO. 7--INTEGRATED
LOGISTICS SUPPORT (ILS) DOCUMENTS

APPENDIX H

QC PROCEDURE NO. 7--INTEGRATED LOGISTICS SUPPORT (ILS) DOCUMENTS

H-1. **PRODUCT.** Operation and maintenance (O&M) manuals, training plans and manuals, master equipment lists (MEL's), ILS program plans, ILS surveys, O&M analyses and plans, recommended spare and repair parts lists, provisioning plans, calibration plans, and Army Facilities Components System (AFCS) documents.

H-2. **PURPOSE/SCOPE.** This procedure describes the activities and responsibilities required to ensure that all ILS products are properly prepared and controlled and are high- quality products. This procedure is applicable to ILS products prepared by A-E firms under contract to USAESCH.

H-3. **REFERENCES.**

- a. DNA 4100.35, Integrated Logistics Support for DOD Systems and Equipment.
- b. ER 1110-1-12, Engineering and Design Quality Management.
- c. HNDEM 1110-1-1, Engineering Guidance Design Manual for Architect-Engineers.

H-4. **RESPONSIBILITIES.**

a. The division chief is responsible for ensuring that all ILS product reviews made by his or her division are of high quality and will result in the production of high-quality products by the A-E firm. He or she is responsible for monitoring this QC procedure to ensure proper implementation for achieving high-quality reviews of ILS products.

b. The branch chief is responsible for ensuring that all reviews of ILS products are comprehensive and that all QC checks have been made and properly documented.

c. The senior engineer is responsible for reviewing the work of the project engineer to ensure that a high-quality review of ILS products has been made and properly documented.

d. The project engineer is responsible for making a comprehensive review of ILS products to ensure the high quality of the products produced by the A-E firm and for properly documenting his or her review.

H-5. **PROCEDURE.**

a. The project manager tasks the appropriate Directorate of Engineering divisions, through the Service Branch, to review ILS products produced for USAESCH by an A-E firm.

b. The Service Branch logs in the tasking memorandum, assigns a control number, and distributes the memorandum to all divisions involved with the activity.

c. The memorandum is logged into the division(s) and distributed to the applicable branch(es).

d. The branch chief assigns the review activity either to a project engineer or to a senior engineer who then assigns it to a project engineer. The exact routing depends on the organization of the branch.

e. The project engineer makes a comprehensive review of the ILS product and prepares a CEHND Form 7 comments package. The package is initialed (QC Checkpoint 7-1) by the project engineer and forwarded either to the senior engineer or to the branch chief, depending on the organization of the branch. The CEHND Form 7 comments serve as documentation for the review activity.

f. The senior engineer, as applicable, makes a cursory review of the ILS product, reviews the CEHND Form 7 comments package, and checks the package for the project engineer's initials. When his or her review is complete, the senior engineer initials (QC Checkpoint 7-2) the comments package and forwards it to the branch chief.

g. The branch chief reviews the CEHND Form 7 comments package to ensure that a high-quality review has been made and properly documented. When the branch chief is satisfied with the review of the ILS product, he or she initials (QC Checkpoint 7-3) the package and forwards it to the division chief.

h. The division chief reviews the CEHND Form 7 comments package to ensure that all reviews have been made, signs (QC Checkpoint 7-4) a transmittal memorandum when he or she is satisfied with the comments package, and forwards the package to the Service Branch.

i. The Service Branch logs in the comments package and forwards it to the project manager.

H-6. DOCUMENTATION. The documentation requirements for ILS products consist of the CEHND Form 7 comments package and the transmittal memorandum signed by the division chief. The comments package will be retained by the branch as permanent QA records. The transmittal memorandum will be retained by the division as permanent QA records.

APPENDIX I

QC PROCEDURE NO. 8--SYSTEMS SAFETY

APPENDIX I

QC PROCEDURE NO.8--SYSTEMS SAFETY

I-1. PRODUCT. Systems safety in design and accident prevention plans for projects.

I-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities required to ensure that all CEHNC designs and contractor-produced designs are reviewed for safety in design (systems safety) and that projects have accident prevention plans. This procedure is applicable to activities performed in-house, by other USACE agencies for USAESCH, and by A-E firms under contract to USAESCH.

I-3. REFERENCES.

a. Applicable safety publications, industrial standards and related state, local, and Federal standards.

b. 29 CFR Part 1910, Occupational Safety and Health Standards.

c. Architectural and Engineering Instructions: Design Criteria.

d. EM 385-1-1, Safety and Health Requirements Manual.

e. ER 1110-1-12, Engineering and Design Quality Management.

f. USACE and client standards and codes.

I-4. RESPONSIBILITIES.

a. The Systems Engineering Division chief has overall responsibility for ensuring that safety has been incorporated into designs. He or she is responsible for ensuring that all project designs have been reviewed by the systems safety engineering team to ensure that safety policy and practice have been incorporated into designs.

b. The USAESCH Safety Manager is responsible for ensuring that an accident prevention plan is produced for in-house construction projects. The project manager is responsible for ensuring that work plans and accident prevention plans are provided to the systems safety team for review on contractor construction projects.

c. The systems safety team leader is responsible for ensuring that all accident prevention plans produced or reviewed by the team are of high quality, that they meet USACE requirements, and that all QC checks have been made and properly documents.

I-5. PROCEDURE.

a. The Directorate of Programs and Project Management, through the responsible project manager, tasks the systems safety team, via the Service Branch to produce an accident prevention plan for in-house projects or to review accident prevention plans produced by other

USACE agencies or contractors as part of an overall construction work plan. The project manager also tasks the systems safety team to review designs to ensure safety has been incorporated into the design.

b. The Service Branch logs in the tasking memorandum, assigns a control number, and distributes the memorandum to all divisions involved with the activity.

c. The systems safety team leader assigns the task to the appropriate safety discipline(s) based on project requirements, work load, and capabilities of the safety professional.

(1) For tasks involving the review of accident prevention plans or designs produced by other USACE agencies or outside agencies (A-E firms and/or contractors), the following procedure will be followed:

(a) The safety professional (safety engineer, safety specialist, or industrial hygienist) makes a comprehensive review of the other USACE agency's or outside agency's submittal, including comparison of document content with USACE requirements and the applicable documents specified in paragraph I-3 above, then prepares a CEHND Form 7 comments package. The package is initialed (QC checkpoints 8-1 and 8-2, respectively) by the preparing safety professional and forwarded to the systems safety team leader. The CEHND Form 7 comments package will serve as documentation of the review activity.

(b) The systems safety team leader reviews the comments package to ensure that a high-quality review has been made. When the team leader is satisfied that a high-quality review has been made and documented, he or she initials (QC checkpoint 8-3) the package and forwards it to the division chief for approval.

(c) The division chief reviews the comments package to ensure that all reviews have been made, initials (QC checkpoint 8-4) the package, then returns the tasking memorandum and the comments package to the Service Branch to clear the suspense and forward the package to the Directorate of Program and Project Management.

(d) The responsible project manager will receive the final review comments, via the Service Branch, and will arrange for their incorporation by other USACE agencies or A-E firms, as applicable.

(2) The following procedure will be followed for developing in-house accident prevention plans.

(a) The systems safety team leader determines and documents which state, local, USACE, HNC, and Federal safety standards are applicable to the project (QC checkpoint 8-5). The systems safety team leader then assigns the task to the appropriate safety professional who develops and initials a draft accident prevention plan incorporating the safety requirements of the project (QC checkpoint 8-6). This action completes the draft level of safety effort. The draft accident prevention plan is forwarded to the responsible project manager for distribution to the applicable branches for review.

(b) Comments on the draft accident prevention plan are returned to the safety professional who incorporates the applicable ones into the final document and initials it prior to forwarding it to the systems safety team leader (QC checkpoint 8-7). The systems safety team leader reviews the final accident prevention plan or format and conformance to USAESCH and USACE procedures and requirements. The systems safety team leader will initial the package (QC checkpoint 8-8) to indicate his or her concurrence.

(c) The Systems Engineering Division chief reviews the accident prevention plan to ensure that this QC procedure has been properly implemented. His or her signature (QC checkpoint 8-9) on a transmittal memorandum signifies that this implementation has been accomplished. The document is then

forwarded directly to the project manager for incorporation into the final project package. The tasking memorandum is returned to the Service Branch for clearance.

I-6. DOCUMENTATION. Copies of the annotated comments for design reviews and contractor accident prevention plans are retained by the engineering and support branches as permanent QC records. The original comments for the documents are retained by the responsible project manager as permanent QC records.

APPENDIX J

QC PROCEDURE NO. 9--HEADQUARTERS, U.S. ARMY
CORPS OF ENGINEERS (HQUSACE) GUIDANCE DOCUMENTS

APPENDIX J

QC PROCEDURE NO. 9--HEADQUARTERS, U.S. ARMY
CORPS OF ENGINEERS (HQUSACE) GUIDANCE DOCUMENTS

J-1. PRODUCT. This procedure covers the preparation by in-house personnel, other USACE agencies, and A-E firms of Corps of Engineers guide specifications (CEGS's), Corps of Engineers abridged guide specifications (CEAGS's), technical manuals (TM's), engineer manuals (EM's), engineer pamphlets (EP's), engineer technical letters (ETL's), architect-engineer instructions (AEI's) and other guidance documents required by HQUSACE. CEGS and CEAGS provide the basic contract specifications for construction. AEI's, TM's, EM's, EP's, ETL's, and the other HQUSACE guidance documents prepared by USAESCH are primarily design criteria documents.

J-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities required to ensure that all HQUSACE guidance documents prepared by USAESCH are of high quality, meet HQUSACE requirements, are properly controlled, and are prepared for publication in accordance with current requirements.

J-3. REFERENCES.

- a. Applicable industrial standards, technical publications, and Federal regulations.
- b. AR 25-30, The Army Integrated Publishing and Printing Program.
- c. Architectural and Engineering Instructions: Design Criteria.
- d. DA PAM 310-20, Administrative Publications: Action Officers Guide.
- e. ER 1110-1-12, Engineering and Design Quality Management,
- f. ER 1110-345-720, Construction Specifications.
- g. USAESCH guidance documents.

J-4. RESPONSIBILITIES.

a. The Cost Engineering Division chief has overall responsibility for the quality of HQUSACE guidance documents prepared by USAESCH.

b. The Guide Specifications Branch chief is responsible for ensuring that HQUSACE guidance documents prepared by USAESCH are of high quality, that they meet HQUSACE requirements, and that all QC checks have been made and properly documented. To accomplish this, the branch chief utilizes the following personnel.

(1) A clerk who is responsible for the logging in and out of all taskings received via the Service Branch and taskings received by the branch chief from sources other than the Project Manager.

(2) Technical criteria specialists who are responsible for the contents and format of the documents assigned to them, based on technical discipline, for preparation.

(3) An engineering technician who is responsible for compatibility of documents with appropriate computer language systems and a final QC check of all documents sent to HQUSACE for approval.

(4) Specifications clerks who are responsible for keyboarding the HQUSACE guidance documents into computers in conformance with the appropriate computer system and for the continuing update of these documents by changes, Notices and Special Changes.

J-5. PROCEDURE.

a. For projects funded through the Project Manager:

(1) The Project Manager tasks the Guide Specifications Branch, via the Service Branch, to produce guidance documents in-house or to review guidance documents produced by other USACE agencies or A-E firms and schedules reviews for these documents at the appropriate final stages of completion.

(2) The Service Branch logs in the tasking memorandum, assigns a control number, and distributes the memorandum as required.

(3) The secretary logs in the memorandum and forwards it to a criteria specialist in accordance with established assignments.

b. For projects not funded through the Directorate of Programs and Project Management (direct taskings from HQUSACE, Civil Works, routine Notice updates, etc.):

(1) The branch chief assigns the task to a criteria specialist, and the secretary logs it in and delivers it to the designated employee.

(2) For Notices, the lead specifications clerk goes through the Service Branch to assign the task to the appropriate criteria specialist in CEHNC or directly assigns the task to the responsible criteria specialist outside CEHNC.

c. The Guide Specifications Branch internal QC system includes monitoring by the branch chief of each step in the document preparation process.

(1) When the tasking involves review comments, the criteria specialist prepares a CEHND Form 7 comments package, which is signed (QC Checkpoint 9-1) by the criteria specialist and initialed (QC Checkpoint 9-2) by the branch chief. The comments package serves as documentation of the review activity.

(2) When the tasking involves final preparation of guidance documents for approval at HQUSACE, the documents are reviewed and the transmittal form initialed (QC Checkpoints 9-3, 9-4, 9-5, and 9-6, respectively) by the criteria specialist, the engineering technician, and the branch chief, then forwarded to the division chief for approval.

(3) The division chief reviews the transmittal package to ensure that all taskings have been completed, initials (QC Checkpoint 9-7) the package, and returns it to the Guide Specifications Branch. As applicable, the tasking memorandum and comments or copy of the transmittal form are returned to the Service Branch to clear the suspense and for forwarding to the Project Manager.

J-6. DOCUMENTATION. Each of the criteria specialists maintains a chronological file for every document for which he or she is responsible. The files contain copies of tasking memorandums, CEHND Form 7

comments, and transmittal forms to document actions taken. The files are purged periodically at the discretion of the criteria specialist to avoid accumulation of unneeded papers.

APPENDIX K

QC PROCEDURE NO. 10--ENVIRONMENTAL DOCUMENTS

APPENDIX K

QC PROCEDURE NO. 10--ENVIRONMENTAL DOCUMENTS

K-1. PRODUCT. Environmental assessments, Environmental Impact Statements, environmental baseline studies, Resource Conservation and Recovery Act (RCRA) Part B hazardous waste permits, waste discharge permits, soil and groundwater hazardous waste investigations, water supply studies, risk assessments, Comprehensive Environmental Response Compensation and Liability Act (CERCLA) remedial investigations/feasibility studies, RCRA facility investigations/corrective measures studies, and wastewater characterization studies.

K-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities required to ensure that all environmental documents are properly controlled, are of high quality, and meet or exceed user requirements.

K-3. REFERENCES.

- a. AR 25-400-2, The Modern Army Record keeping System.
- b. AR 200-1, Environmental Protection and Enhancement.
- c. AR 200-2, Environmental Effects of Army Actions.
- d. AR 415-15, Military Construction, Army (MCA) Program Development.
- e. Code of Federal Regulations, Title 40, Protection of the Environment, most recent edition.
- f. Environmental Protection Agency (EPA), various guidance documents as needed.
- g. ER 1110-1-12, Engineering and Design Quality Management.
- h. ER 1110-1-263, Chemical Data Quality Management for Hazardous Waste Remedial Activities.

K-4. RESPONSIBILITIES.

a. The division chief is responsible for ensuring that environmental documents, remedial designs, waste minimization studies, environmental compliance audits produced by his or her division are of high quality and are produced in accordance with established procedures.

b. The branch chief has primary responsibility for QC for all documents produced by his or her branch. The branch chief will screen each project and assign the project to the appropriate project engineer. The branch chief is responsible for ensuring that the project engineer fully understands the scope of the project prior to commencing work, for ensuring that the project engineer is aware of the suspense date, for ensuring that interdisciplinary coordination has taken place, and for reviewing all work before it leaves the branch.

c. Senior engineers are responsible for providing guidance and assistance to less- experienced personnel. Such guidance/assistance is usually provided as requested by the project engineer; however, especially on large projects where a senior engineer is assisted by lower-graded personnel, this responsibility may be specifically assigned to the senior engineer by the branch chief. In such cases, the

senior engineer is responsible for reviewing all work performed by the project engineers prior to its being submitted to the branch chief.

d. The project engineer is responsible for ensuring that all instructions, criteria, and data are complete and totally understood; for alerting the supervisor to potential schedule conflicts; and for interdisciplinary coordination. The project engineer is responsible for the quality of his or her own work.

K-5. PROCEDURE.

a. The branch chief reviews each project received from the Project Manager and assigns the project to the appropriate project engineer.

b. The project engineer reviews the project assigned to him or her, determines what internal and external coordination is necessary, and ensures that such coordination is effected. The project engineer also determines applicable technical and regulatory requirements and applies them to the project. For SOW preparation, the Civil Structures Division internal QC procedure includes designation of a technical manager who is responsible for coordination among all involved disciplines, review and initialing (QC Checkpoint 10-1) of the final document by himself or herself, and submittal of the final document for review by the chief of each branch involved in its development. After completion of the assigned task, the project engineer reviews his or her own work to ensure that it is accurate and of high quality.

c. Senior engineers accomplish assigned tasks and reviews all work which he or she produces for accuracy and high quality. As required, a senior engineer will also review work produced by project engineers under him or her to ensure that the work produced is of high quality. Approved work will be initialed (QC Checkpoint 10-2) by the senior engineer.

d. The branch chief will review all documents produced by his or her branch prior to their being released to the division chief to ensure that the documents are of high quality, satisfy requirements, and that applicable QC procedures were adhered to in their production. Approved work will be initialed (QC Checkpoint 10-3) by the branch chief.

e. The division chief reviews all environmental documents produced within his or her division to ensure that all environmental documents are of high quality, have been prepared in accordance with applicable QC procedures, and satisfy requirements. Approved work will be initialed (QC Checkpoint 10-4) by the division chief.

f. External review of environmental documents is sometimes solicited from other offices or required by Corps, Army, or DOD policy. These reviewers include Federal, state, and local regulatory agencies, Corps Centers of Expertise, major Army commands, Army installations, and the Army Environmental Center. Requests/submittals for external review, annotation of review comments, and incorporation of such comments into work documents are the responsibility of the Project Manager. Informal requests for information may be made by the project engineer.

g. Completed documents are forwarded through the Service Branch to the Project Manager.

K-6. DOCUMENTATION. Record copies of all environmental documents are maintained in the Environmental Protection and Utilities Branch files in accordance with AR 25-400-2.

APPENDIX L

QC PROCEDURE NO. 11--GEOTECHNICAL INVESTIGATIONS
AND TOPOGRAPHIC SURVEYS

APPENDIX L

QC PROCEDURE NO. 11--GEOTECHNICAL INVESTIGATIONS AND TOPOGRAPHIC SURVEYS

L-1. PRODUCT. Geotechnical investigations and topographic surveys.

L-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities required to ensure that geotechnical investigations and topographic surveys are of high quality and meet or exceed user requirements.

L-3. REFERENCES.

- a. ER 1110-1-12, Engineering and Design Quality Management.
- b. HNDM 1110-1-1, Engineering Guidance Design Manual for Architect-Engineers.

L-4. RESPONSIBILITIES.

a. The division chief is responsible for ensuring that geotechnical investigations and topographic surveys produced by his or her division are of high quality and are produced in accordance with established procedures.

b. The Geotechnical Branch chief has primary responsibility for geotechnical investigations, and the Site Development Branch chief has primary responsibility for topographic surveys. The branch chief will screen each project and assign the project to the appropriate senior project engineer. The branch chief is responsible for reviewing all work before it leaves the branch.

c. If a senior engineer and a project engineer work together on an assignment, the senior engineer is responsible for ensuring that the project engineer fully understands the scope of the project prior to commencing work, for ensuring that the project engineer is aware of the suspense date, and for reviewing all work performed by the project engineer prior to its being submitted to the branch chief.

d. The project engineer is responsible for ensuring that all instructions, criteria, and data are complete and totally understood, for alerting the senior engineer or the supervisor to potential schedule conflicts, and for interdisciplinary coordination. The project engineer is responsible for the quality of his or her own work.

L-5. PROCEDURE.

a. The branch chief reviews each project received from the Project Manager and assigns the project to the appropriate senior/project engineer.

b. The project engineer will review the project assigned to him or her, determine what internal coordination is necessary, and ensure that such coordination is effected. The project engineer will document all comments relating to his or her work activities in a CEHND Form 7 comments package. The project engineer will also determine what technical and regulatory requirements are applicable to the project and ensure their application. The project engineer will review his or her own work to ensure that it is accurate and of high quality and will initial the CEHND Form 7 comments package.

c. The senior engineer will review all work produced by himself or herself or by the project engineers under him or her to ensure that the work produced is of high quality. The senior engineer then initials (QC Checkpoint 11-1) the CEHND Form 7 comments package.

d. The branch chief will review all products produced by his or her branch prior to their being released to the Project Manager or elsewhere to ensure that applicable QC procedures were adhered to in their production. The branch chief will then initial (QC Checkpoints 11-2 and 11-3, respectively) the CEHND Form 7 comments package and the tasking memorandum for submittal to the division chief for approval and transmittal to the Service Branch.

e. The division chief will review all geotechnical investigations and topographic surveys produced within his or her division to ensure that they are of high quality, have been prepared in accordance with applicable QC procedures, and satisfy requirements. The division chief will then initial (QC Checkpoints 11-4 and 11-5, respectively) the CEHND Form 7 comments package and the tasking memorandum for transmittal to the Service Branch.

f. Geotechnical investigations and topographic surveys are normally performed by geographic districts. These districts receive their tasking from the Project Manager at the request of the Directorate of Engineering. The branch will produce an IGE, a tasking letter, and a schedule in coordination with the Project Manager, to be used during negotiations with the districts.

g. The completed work is received by the branch for review. When all questions have been satisfied between the branch and the district, the geotechnical investigation/ topographic survey is released to the Project Manager or to the design A-E or to in-house design personnel. In the case of in-house designs, the Site Development Branch and the Geotechnical Branch coordinate with other in-house branches to ensure proper design.

h. Geotechnical investigations and topographic surveys which are performed by contract are accomplished by the procedures normally used for design work by A-E contract (see appendix C). (QC Checkpoints 11-6, 11-7, 11-8, and 11-9)

L-6. DOCUMENTATION. Record copies of all products produced by the Site Development Branch and the Geotechnical Branch are maintained in the respective branch files in accordance with AR 25-400-2.

APPENDIX M

QC PROCEDURE NO. 12 - AUTOMATED SYSTEMS

APPENDIX M

QC PROCEDURE NO. 12 - AUTOMATED SYSTEMS

M-1. **PRODUCT.** This procedure covers the preparation by in-house personnel and contractors. Automated engineering support systems to include the Tri-Service Automated Cost Engineering System (TRACES), Programming, Administration and Execution (PAX) system and the Engineer Management Automation Army Reserve (EMAAR) system. These support systems reflect the written requirement of the proponent (client) within the boundaries of Federal, State, and installation codes and standards.

M-2. **PURPOSE/SCOPE.** This procedure describes the activities and responsibilities required to ensure that all engineering support systems are properly prepared and controlled, are high quality and cover every phase of the life cycle of automated engineering support systems, including the acquisition of hardware; system development; fielding; and operation, maintenance and enhancements of the systems and related software and is applicable to activities performed in-house or by contractors.

M-3. REFERENCES.

- a. AR 25-3, Army Life Cycle Management of Information Systems.
- b. CEHNC-SI Publication, Standing Operating Procedure (SOP) Life Cycle Management of Automated Information Systems (AIS). (Draft)
- c. DOD HCI Style Guide, Version 1.0, 12 Feb 92. (This document provides guidelines for Graphical User Interfaces and should be used in developing and enhancing all systems).
- d. ER 1110-1-12, Engineering and Design QUALITY MANAGEMENT.

M-4. RESPONSIBILITIES.

- a. The Cost Engineering Division chief has overall responsibility for the preparation of the Automated Engineering Support Systems. He or she is responsible for ensuring that all support systems produced by the Division or by A-E firms are of high quality and satisfy proponent and USACE requirements.
- b. The branch chief is responsible for ensuring that all engineering support systems produced or reviewed by his or her branch are of high quality, that they meet proponent and USACE requirements, and that all QC checks have been made and properly documented.
- c. The project engineer/program analyst is responsible for developing and finalizing the engineering support systems' work relating to the engineering support systems and ensure that proponent and USACE requirements have been met and that the engineering systems produced are of high quality.
- d. The project manager prepares the scheduling and funding for the project specifications work and coordinates the execution of all activities associated with projects among in-house and contractor agencies and personnel as required.

M-5. PROCEDURE.

- a. The Automated Systems project manager schedules, plans, and budgets for the desired proponent effort. He also sets up and monitors in-programs reviews of in-house and contractor efforts.

The proponent tasks the Automated Systems branch project manager directly to produce desired automated engineering project support systems.

b. The Automated Systems branch chief ensures the tasks in the project are assigned to the appropriate project engineer/program analyst based on qualifications, work load, and capabilities.

c. The following procedures are followed for the development of engineering support project.

(1) The project engineer/program analyst receives the tasking from the project manager and evaluates the proponent requirements. He or she initiates the efforts to begin the task.

(2) The project engineer/program analyst provides the effort to complete the package in conformance to USACE and proponent QC procedures at completion. The project engineer/ program analyst will initial (QC Checkpoint 12-1) the package to indicate his or her concurrence.

(3) The Automated Systems branch chief makes a final review of the engineering support systems produced by the project engineer/program analyst. He or she reviews the document for completeness, high quality, and adherence to accepted procedures (all previous QC checks have been performed and documented). The branch chief's verification of the document is accomplished by his or her initialing (QC Checkpoint 12-2) the document, after which he or she forwards it to the division chief.

(4) The Cost Engineering Division chief reviews the Automated Systems Engineering support package to ensure that QC procedures have been properly implemented, then signs (QC Checkpoint 12-3) a transmittal memorandum signifying that this implementation has been accomplished. The package is then returned directly to the Automated Systems project manager for delivery to the proponent.

M-6. DOCUMENTATION. Original comments for the Automated Engineering Support systems are retained by the responsible project manager as permanent QA records.

APPENDIX N

QC PROCEDURE NO. 13 --QA ORIENTATION PROGRAM

APPENDIX N

QC PROCEDURE NO. 13--QA ORIENTATION PROGRAM

N-1. PRODUCT. A proficient knowledge of the QA program and QC procedures.

N-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities required for initial and refresher orientation for all Directorate of Engineering personnel with respect to the QA program and applicable QC procedures.

N-3. RESPONSIBILITIES.

a. The Chief of Design is responsible for oversight, maintenance, and monitoring of the orientation program within the Directorate of Engineering.

b. Each division chief is responsible for establishing the QA orientation requirements that will ensure proper implementation of the QA program and applicable QC procedures by his or her division personnel and for monitoring to ensure that all division personnel are properly oriented.

c. Each branch chief is responsible for ensuring that his or her personnel receive adequate orientation with respect to the QA program and the QC procedures applicable to his or her branch's activities.

d. The QA manager is responsible for establishing and maintaining a QA orientation program for the Directorate of Engineering.

N-4. PROCEDURE.

a. The branch chief will review the Directorate of Engineering QA program document to determine which QC procedures are applicable to his or her branch. A listing of these procedures will be submitted to the division chief for incorporation into an orientation program for the division. The branch chief will revise the listing when requirements change. A statement detailing which procedures are being met by the branch, signed (QC Checkpoint 13-1) by the branch chief and initialed (QC Checkpoint 13-2) by the division chief, will be maintained by the branch chief.

b. The division chief will consolidate the orientation requirements from the different branches and submit the QA orientation requirements from the different branches and submit the QA orientation requirements for the division to the QA manager. Any change in requirements will be coordinated with the QA manager. The division chief will sign (QC Checkpoint 13-3) a transmittal memorandum to signify his or her agreement with the requirements for the branches.

c. The QA manager will establish and maintain an orientation program that will satisfy the QA orientation requirements of all Directorate of Engineering personnel. The QA manager will establish a 12-month master orientation schedule in coordination with the division chiefs to

ensure that personnel in their divisions receive orientation on the QA program and applicable QC procedures, on new procedures, and on revised program elements and procedures. The QA manager is responsible for arranging for instructors, facilities, etc., for each orientation session and for documenting the orientation of each trainee. The QA manager will initial (QC Checkpoint 13-4) the orientation form for each employee to verify that the employee has received the appropriate instruction. Division Chiefs are

responsible for ensuring that their personnel are scheduled for the required orientation and are in attendance at the sessions for which they have been scheduled.

d. The branch chief will review the orientation records of his or her personnel quarterly to ensure that orientation is current for all his or her personnel. The branch chief will initial (QC Checkpoint 13-5) the orientation records to verify the review.

N-5. DOCUMENTATION. All orientation will be documented as indicated by table I-1. The original orientation records for all Directorate of Engineering personnel will be maintained by the QA manager. Copies of these records will be sent to branch chiefs when orientation is updated. The most current record for branch personnel will be maintained by the branch chief. The QA manager will maintain a master orientation record which will indicate the current orientation status of all Directorate of Engineering personnel.

Table N-1. Directorate of Engineering QA Orientation Record

(Employee's Name)

<u>PROCEDURE</u>	<u>DATE & TIME</u>	<u>EMPLOYEE'S INITIALS</u>	<u>INSTRUCTOR'S INITIALS</u>	<u>COMMENTS</u>
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APPENDIX O

QC PROCEDURE NO. 14--AUDITING AND SURVEILLANCE

APPENDIX O

QC PROCEDURE NO. 14--AUDITING AND SURVEILLANCE

O-1. PRODUCT. Documentation that will ensure that all QC procedures have been successfully completed.

O-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities required to ensure that Directorate of Engineering products are regularly audited to verify that QC procedures are being followed. This procedure is applicable to all products produced by the Directorate of Engineering.

O-3. REFERENCES.

a. CEHND 1110-1-20, Standing Operating Procedure (SOP) for the Development of In-House Designs.

b. CEHNDP 1115-1-2, Standing Operating Procedure for Criteria Development.

c. HNDM 1110-1-1, Engineering Guidance Design Manual for Architect-Engineers.

d. HNC Design Quality Management Plan (Draft)

e. ER 1110-1-12, Engineering and Design Quality Management

O-4. RESPONSIBILITIES.

a. Chief of design is responsible for designating individuals to perform the audit and surveillance.

b. Division chiefs are responsible for ensuring that applicable QC procedures are followed for all Directorate of Engineering products that are issued from their respective divisions.

c. Branch chiefs are responsible for ensuring that applicable QC procedures are followed for all Directorate of Engineering products that are issued from their respective branches.

d. Senior engineers are responsible for performing applicable QC procedures on the Directorate of Engineering products that they issue and for ensuring that applicable QC procedures are followed for all Directorate of Engineering products that are issued by project engineers whose efforts they supervise/coordinate.

e. Project engineers are responsible for performing applicable QC procedures on the Directorate of Engineering products that they issue.

f. The Independent Audit Team is responsible for performing audits in each branch to verify that applicable QC procedures are being followed.

O-5. PROCEDURE.

a. Each branch chief will assist the Independent Audit Team in the performance of its audit. In a signed (QC Checkpoint 14-1) letter to the Chief of Design, the branch chief will verify any deficiencies noted by the Independent Audit Team and document the course of action to be taken to rectify the deficiencies. The branch chief will perform a follow up audit prior to the next Independent Audit Team audit

to ensure that all problems have been solved. A copy of this follow up audit, signed (QC Checkpoint 14-2) by the branch chief, will be given to the Chief of Design.

b. The Independent Audit Team will audit each branch to verify that applicable QC procedures are being followed and will prepare a report on its findings. The report will be signed (QC Checkpoints 14-3 and 14-4, respectively) by the Independent Audit Team chairman and the QA manager. The report will be issued to the Director of Engineering, with copies being sent to the affected division and branch chiefs.

O-6. DOCUMENTATION. Each branch chief will maintain a file of the completed QC audits for at least one year from time of completion. The Chief of Design will maintain a file of the Independent Audit Team reports for at least one year from time of issuance.

APPENDIX P
DIRECTORATE OF ENGINEERING
QA CHECKLIST

APPENDIX P

DIRECTORATE OF ENGINEERING QA CHECKLIST

QC PROCEDURE 1: DOCUMENT CONTROL--Design Review Documents

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
1-1, page B-2	Tracking of classified documents	Reviewing engineer signs log
1-2, page B-2	Tracking of unclassified documents	Service Branch projects unit employee signs CEHND Form 893

QC PROCEDURE 1A: DOCUMENT CONTROL-Shop Drawings Review Process (Chem Demil Typical)

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
1-3, page B-2	Receive and login-in of shop drawing package	Receive and inspect shop drawing package. Deliver to appropriate technical branch(es) for review.
1-4, page B-3	Review of shop drawing package	Reviewing engineer/architect prepares comments (if required) and initial routing slip.
1-5, page B-3	Review of shop drawing package comments.	Branch Chief reviews and initials engineer/architect comments.
1-6, page B-3	Inventory returned shop drawing package	Service Branch personnel inventory returned shop drawing package with comments.
1-7, page B-3	Reproduce copies of marked-up shop drawings	Service Br. personnel reproduce copies of marked-up shop drawings and transmit back to site.
1-8, page B-4	File marked-up copy of shop drawings	Service Br. personnel file marked-up copy of shop drawings with comments, forms, & transmittal sheets.

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QC PROCEDURE 2: ENGINEERING DESIGN DOCUMENTS--A-E Submittals

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
2-1, page C-3	Review of A-E's submittal and preparation of CEHND Form 7 comments package	Project engineer initials CEHND Form 7 comments package
2-2, page C-3	Review of CEHND Form 7 comments package	Senior engineer initials CEHND Form 7 comments package
2-3, page C-3	Review of CEHND Form 7 comments package	Branch chief initials CEHND Form 7 comments package
2-4, page C-3	Review of CEHND Form 7 comments package	Division chief signs transmittal memorandum

**QC PROCEDURE 2: ENGINEERING DESIGN DOCUMENTS--In-House Activities
(Concept (35%), Intermediate, Final Design)**

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
2-5, page C-4	Review of design	Project checker initials and dates appropriate documents
2-6, page C-4	Review of design	Senior engineer initials and dates appropriate documents
2-7 and 2-8, page C-4	Review of design	Branch chief signs and dates drawings and initials and dates other design products
2-9, 2-10, and 2-11, page C-5	Updating of design	Designer, senior engineer, and branch chief initial comments package

QC PROCEDURE 2: ENGINEERING DESIGN DOCUMENTS--Specifications Development

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
2-12, page C-5	Review of marked up CEGS and project specifications and preparation of CEHND Form 7 comments package	Specifications engineer initials CEHND Form 7 comments package
2-13, page C-5	Review of CEHND Form 7 comments package	Programs/Projects Specifications Branch chief initials CEHND Form 7 comments package
2-14, page C-5	Review of draft specifications	Programs/Projects Specifications Branch chief initials package

QC PROCEDURE 2: ENGINEERING DESIGN DOCUMENTS--Independent Technical Review and Finalization of Design

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
2-15 and 2-16, page C-6	Review of construction bid package	Independent technical review team members sign and date final drawings and initial and date other design products
2-17, 2-18, 2-19, 2-20, page C-6	Finalization of design	Project engineer, drafter, project checker, and branch chief initial/ sign appropriate documents
2-21, page C-6	Review of design index sheets	Division chiefs sign
2-22, page C-6	Review of design	Chief of Design signs drawing package
2-23, page C-6	Review of design	Director of Engineering signs drawings package
2-24, page C-6	Authentication of design	Commanding Officer, HNC, signs drawings package

QC PROCEDURE 2: ENGINEERING DESIGN DOCUMENTS--Shop Drawings

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
2-25, 2-26 page C-7	Review of Shop Drawing	Project engineer initials CEHND Form 124 and routing slip, DA Form 1222
2-27, page C-7	Review of CEHND Form 124 Comment Package	Branch chief initials CEHND Form 124
2-28, 2-29, page C-7	Review of CEHND Form 124	Branch chief initials CEHND Form 124 and DA Form 1222

QC PROCEDURE 3: ENGINEERING CHANGE PROPOSALS (ECP's)

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
3-1, page D-1	Review of ECP	Systems Engineering Division chief signs transmittal memorandum
3-2, page D-1	Review of ECP	Systems Engineering Division chief signs

		transmittal memorandum
3-3, page D-2	Review of ECP	Applicable division chiefs sign transmittal memorandum
3-4, page D-2	Transmittal of USAESCH position determinations and appropriate review comments	CM engineer signs facsimile transmittal
3-5, page D-2	Review of CCB meeting minutes	Operations Branch chief signs minutes
3-6, page D-2	Review of summary-of-CCB- actions memorandum	Commanding Officer, HNC, signs memorandum
3-7, page D-2	Review of data base printout	CM engineer initials printout

QC PROCEDURE 4: COST ESTIMATES--Review of A-E Work

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
4-1, page E-2	Review of A-E firm's submittal and preparation of CEHND Form 7 comments package	Cost engineer initials CEHND Form 7 comments package package
4-2, page E-2	Review of CEHND Form 7 comments package	Senior cost engineer initials CEHND Form 7 comments package
4-3, page E-2	Review of CEHND Form 7 comments package	Branch chief initials CEHND Form 7 comments package
4-4, page E-2	Review of CEHND Form 7 comments package	Division chief initials CEHND Form 7 comments package

QC PROCEDURE 4: COST ESTIMATES--In-House Cost Estimating Not Performed via MCACES

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
4-5, page E-3	Review of cost estimate	Project checker initials and dates cost estimate
4-6, page E-3	Review of cost estimate	Senior cost engineer initials and dates cost estimate
4-7, page E-3	Review of cost estimate	Branch chief initials and dates cost estimate

4-8, page E-3	Review of cost estimate	Division chief initials and dates cost estimate
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QC PROCEDURE 4: COST ESTIMATES--In-House Cost Estimating Performed via MCACES

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
4-9, page E-4	Review of cost estimate	Senior cost engineer initials and dates cost estimate
4-10, page E-4	Review of cost estimate	Branch chief initials and dates cost estimate
4-11, page E-4	Review of cost estimate	Division chief initials and dates cost estimate

QC PROCEDURE 5: DESIGN CRITERIA DOCUMENTS--Review of A-E Work

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
5-1 and 5-2, page F-2	Review of A-E firm's submittal and preparation of CEHND Form 7	Project engineer/ systems project engineer initials CEHND Form 7 comments package
5-3, page F-2	Review of criteria and CEHND Form 7 comments package	Senior engineer initials CEHND Form 7 comments package
5-4, page F-2	Review of CEHND Form 7 comments package	Branch chief initials CEHND Form 7 comments package
5-5, page F-3	Review of CEHND Form 7 comments package	Division chief signs transmittal memorandum

QC PROCEDURE 5: DESIGN CRITERIA DOCUMENTS--In-House Criteria Development

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
5-6, page F-3	Review of discipline criteria package	Senior discipline engineer initials criteria package
5-7, page F-3	Review of discipline criteria package	Branch chief initials criteria package
5-8, page F-3	Review of discipline criteria package	Division chief signs transmittal memorandum
5-9 and 5-10, page F-3	Review of draft total criteria package	Senior systems engineer and systems project engineer initial draft

		criteria document
5-11, page F-5	Review of draft total criteria package	Systems Engineering Division branch chief initials draft criteria document
5-12, page F-4	Review of draft total criteria package	Systems Engineering Division chief signs transmittal memorandum
5-13, 5-14, 5-15, and 5-16, page F-4	Review of draft total criteria package	Each engineering branch follows A-E review process process
5-17, page F-4	Review of annotated criteria package	Systems Engineering Division chief signs transmittal memorandum
5-18, 5-19, 5-20, and 5-21, page F-4	Review of final total criteria package	Systems Engineering Division follows A-E review process
5-22, page F-4	Review of final total criteria package	Chief of Design initials final criteria document

QC PROCEDURE 5: DESIGN CRITERIA DOCUMENTS--SOW Development

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
5-23, page F-5	Review of SOW	Senior discipline engineer criteria package
5-24, page F-5	Review of SOW	Branch chief initials criteria package
5-25, page F-5	Review of SOW	Division chief signs transmittal memorandum

QC PROCEDURE 6: PLANNING DOCUMENTS

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
6-1, 6-2, 6-3, and 6-4, page G-2	Review of draft planning document	Senior systems engineer, Analysis Branch chief, Systems Engineering Division chief, and Director

		of Engineering initial and date transmittal memorandum
6-5, page G-2	Review of CEHND Form 7 comments package	Systems engineer initials CEHND Form 7 beside appropriate remark
6-6, 6-7, 6-8, and 6-9, page G-3	Review of final planning document	Senior systems engineer, Analysis Branch Chief, Systems Engineering Division Chief, and Director of Engineering initial and date transmittal memorandum

QC PROCEDURE 7: INTEGRATED LOGISTICS SUPPORT (ILS) DOCUMENTS

QC CHECKPOINT	ACTION	VERIFICATION/AUTHENTICATION
7-1, page H-2	Review of ILS product and preparation of CEHND Form 7 comments package	Project engineer initials CEHND Form 7 comments package
7-2, page H-2	Review of ILS product and CEHND Form 7 comments package	Senior engineer initials CEHND Form 7 comments package
7-3, page H-2	Review of CEHND Form 7 comments package	Branch chief initials CEHND Form 7 comments package
7-4, page H-2	Review of CEHND Form 7 comments package	Division chief signs transmittal memorandum

QC PROCEDURE 8: SYSTEMS SAFETY--Other USACE Agency or Outside Agency (A-E and/or Contractors)

QC CHECKPOINT	ACTION	VERIFICATION/AUTHENTICATION
8-1 and 8-2, page I-2	Review of safety submittal and preparation of CEHND Form 7 comments package	Safety professional initials CEHND Form 7 comments package
8-3, page I-2	Review of CEHND Form 7 comments package on safety submittal	Systems safety team leader initials CEHND Form 7 comments package
8-4, page I-2	Review of CEHND Form 7 comments package on safety submittal	Division chief initials CEHND Form 7 comments package

QC PROCEDURE 8: SYSTEMS SAFETY--In-House Work

QC	VERIFICATION/
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CHECKPOINT	ACTION	AUTHENTICATION
8-5, page I-2	Determination of which state, local, USACE, HNC, and Federal safety standards are applicable to the project	Safety team leader researches and documents applicable safety standards
8-6, page I-2	Preparation of draft accident prevention plan	Safety professional develops draft accident prevention plan incorporating the safety requirements of the project
8-7, page I-3	Incorporates comments on draft accident prevention plan	Preparation of final safety project standard document
8-8, page I-3	Review of final safety project	Systems safety team leader initials the final accident prevention plan
8-9, page I-3	Review of final safety project	Division chief signs transmittal memorandum

QC PROCEDURE 9--HEADQUARTERS, U.S. ARMY CORPS OF ENGINEERS (HQUSACE) GUIDANCE DOCUMENTS--Taskings Involving Preparation of Review Comments

QC CHECKPOINT	ACTION	VERIFICATION/AUTHENTICATION
9-1, page J-2	Review of submittal and preparation of CEHND Form 7 comments package	Criteria specialist signs CEHND Form 7 comments package
9-2, page J-2	Review of CEHND Form 7 comments package	Branch chief initials CEHND Form 7 comments package

QC PROCEDURE 9--HEADQUARTERS, U.S. ARMY CORPS OF ENGINEERS (HQUSACE) GUIDANCE DOCUMENTS--Taskings Involving Preparation of Documents for Approval and Printing at HQUSACE

QC CHECKPOINT	ACTION	VERIFICATION/AUTHENTICATION
9-3, 9-4, 9-5, and 9-6, page J-2	Review of final document	Criteria specialist, engineering technician, and branch chief initial transmittal form
9-7, page J-3	Review of transmittal package	Division chief initials transmittal package

QC PROCEDURE 10: ENVIRONMENTAL DOCUMENTS

QC	VERIFICATION/AUTHENTICATION
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CHECKPOINT	ACTION	AUTHENTICATION
10-1, page K-2	Review of SOW	Technical manager initials SOW
10-2, page K-2	Review of environmental document	Senior engineer initials document
10-3, page K-2	Review of environmental document	Branch chief initials document
10-4, page K-2	Review of environmental document	Division chief initials document

QC PROCEDURE 11: GEOTECHNICAL INVESTIGATIONS AND TOPOGRAPHIC SURVEYS

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
11-1, page L-2	Review of geotechnical investigation or topographic survey	Senior engineer initials CEHND Form 7 comments package
11-2 and 11-3, page L-2	Review of geotechnical investigation or topographic survey	Branch chief initials CEHND Form 7 comments package and tasking memorandum
11-4 and 11-5, page L-2	Review of geotechnical investigation or topographic survey	Division chief initials CEHND Form 7 comments package and tasking memorandum
11-6, 11-7, 11-8, and 11-9, page L-2	Review of geotechnical investigation or topographic survey	Procedures used for design work by A-E contract are followed

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QC PROCEDURE 12: AUTOMATED SYSTEMS

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
12-1, page M-2	Review of Package	Project engineer/program analyst initials package for completion

12-2 page M-3	Review of Package	Branch chief initials package for compliance
12-3 page M-2	Review of Package	Division chief initials package for compliance

QC PROCEDURE 13: QA ORIENTATION PROGRAM

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
13-1, page N-I	Review of QA program document	Branch chief signs state- ment detailing which procedures branch follows
13-2, page N-I	Review of QA program document	Division chief initials state- ment detailing which procedures branch follows
13-3, page N-I	Submission of division QA orientation requirements to QA manager	Division chief signs transmittal memorandum
13-4, page N-2	Employee orientation on QA program and applicable QC procedures	QA manager initials employee orientation form
13-5, page N-2	Quarterly review of orientation records	Branch chief initials orientation records

QC PROCEDURE 14: AUDITING AND SURVEILLANCE

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
14-1, page O-2	Performance of independent audit	Branch chief signs letter to QA manager verifying deficiencies and docu- menting actions to be taken to rectify such deficiencies
14-2, page O-2	Performance of follow up audit	Branch chief sends signed copy of follow up audit report to QA manager
14-3 and 14-4, page	Performance of independent audit	Independent Audit Team chairman and

O-2

QA manager sign
audit report

APPENDIX Q

PROCEDURE FOR MAKING CHANGES TO THE QA MANUAL

APPENDIX Q

PROCEDURE FOR MAKING CHANGES TO THIS MANUAL

Q-1. PRODUCT. A method for recording changes to the Quality Assurance Program Manual.

Q-2. SCOPE. This procedure identifies the activities and approval levels required to implement changes to this manual.

Q-3. REFERENCES. None

Q-4. RESPONSIBILITIES.

a. Anyone can propose changes to the QA manual; however, a quality assurance proponent, who is a member of the QA Team, must endorse the change.

b. ED-ES-P will prepare the change according to the method in this procedure.

c. A quality assurance engineer will review the proposed change for applicability.

d. After discussions with the QA team, the Chief of the QA team will approve and release the change for Internet files.

e. An independent observer (from ED-ES-P) will verify that changes have been implemented according to this procedure.

Q-5. PROCEDURE.

a. Once a change is identified, the change must be proposed to a QA team member or proponent.

b. If a determination is made that a change to the QA manual is necessary, the proposed changes will be provided to S. McAnally, editor, ED-ES-P, who will prepare the text revisions to the original document, prepare an errata sheet, and coordinate the change through ED-SY-O, A. Fanning, QA engineer. A change number will be assigned to the change and a signature sheet attached to the change for coordination among the QA team. The signature sheet must be signed by the proposer, the proponent, a QA reviewer, the Chief of the QA team, the editor/Internet releaser, and an independent QC checker for the change to be implemented.

c. Once all signatures or initials are obtained on the signature sheet (see attachment 1), the approved revision will be incorporated into the QA manual files and the Internet document will also be updated.

d. The errata sheet records all deletions and additions including paragraph restructuring effected by the change. In addition, a copy of the text prior to the approved revision will become a part of the errata section. The Errata Sheets section will be the last appendix to the manual. See attachment 2 for an example of errata information.

Q-6. DOCUMENTATION

A hardcopy of the revised material and the errata sheet will be kept in ED-ES-P with the original manuscript of the document. A diskette file will be also be retained in ED-ES-P. A record copy of all changes will be sent to Arkie Fanning.

Attachment 1

CHANGE PROCEDURE SIGNATURES

Change XX proposed by: _____ Date: _____

QA Proponent: _____ Date: _____

Reviewed by QA Engineer: _____ Date: _____

Approved by Chief, QA Team: _____ Date: _____

Editor/Internet Releaser: _____ Date: _____

QC Check: _____ Date: _____

CEHNC 1110-1-17

Attachment 2

EXAMPLE OF AN ERRATA SHEET

Change XX to HNC 1110-1-17

Deleted: subparagraph b of paragraph D-4. Responsibilities.

“Systems engineering personnel will process VECP’s.”

Added: subparagraph e of paragraph D-6. Documentation.

"Hardcopies of this document will no longer be provided through local distribution.
Users may view the document on the Internet and print copies for personal use."

Deleted: "cost and schedule impacts" in line 4 of paragraph D-3.

***** Original text from the QA manual prior to this change is attached for reference.*****

Change 1
31 October 1996

GLOSSARY

GLOSSARY

Section I: Abbreviations

A-E	architect-engineer
AFCS	Army Facilities Component System
AR	Army regulation
CADD	computer-aided design and drafting
CCB	Configuration Control Board
CDRL	Control Data Requirements List
CEAGS	Corps of Engineers abridged guide specification
CEGS	Corps of Engineers guide specification
CEHNC	Corps of Engineers, Huntsville Center
CEHND	Corps of Engineers, Huntsville Division (Now CEHNC)
CM	configuration management
CT	Directorate of Contracting
DA	Department of the Army
DID	Data Item Description
DNA	Defense Nuclear Agency
DOD	Department of Defense
DPH	Directorate of Public Housing
ECP	engineering change proposal
EM	engineer manual
ENG	engineer
EP	engineer pamphlet
EPA	Environmental Protection Agency
ER	engineer regulation
ETL	engineer technical letter
FAR	Federal Acquisition Regulation
H.C.	Huntsville Center
HQUSACE	Headquarters, U.S. Army Corps of Engineers
IGE	independent Government estimate
ILS	integrated logistics support
INPR	Inventory Project Report
LCCA	life cycle cost analysis
MCA	Military Construction, Army
MCACES	Micro Computer-Aided Cost-Estimating System
MEL	master equipment list
MOU/MOA	Memorandum of Understanding/Memorandum of Agreement
MSC	major subordinate command
OC	Office of Counsel
O&M	operation and maintenance
PDB	Project Development Brochure
PM	project manager/Directorate of Programs and Project Management
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act

RM	Resource Management Office
SOP	standing operating procedure
SOW	statement of work
TM	technical manual
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville

Section II: Terms

ACQUISITION PLAN. A document describing the integrated efforts of all personnel responsible for the significant aspects of an acquisition, such as contracting, engineering, construction, fiscal, legal, small business, etc. The purpose of this plan is to ensure that the Government accomplishes its objective in an effective, economical, and timely manner.

ARCHITECT-ENGINEER (A-E). Any private engineering firm or government agency doing design work for USAESCH.

BASELINE. The agreed-upon criteria which serve as basis for the engineering design, deviation from which requires an ECP. Typical baselines include criteria, concept design, and final design. Baselines must be approved by the Configuration Control Board.

COMPUTER-AIDED DESIGN AND DRAFTING (CADD) BACKUP TAPE. Tape generated for each record copy drawing produced on CADD equipment, duplicating the record copy.

COMPUTER-AIDED DESIGN AND DRAFTING (CADD) BASELINE TAPE. Tape generated at the end of each design phase, at which time drawings and associated information are "frozen" in place, i.e., baselined.

CONFIGURATION CONTROL BOARD (CCB). A board, composed of representatives from organizations affected by design changes, which reviews proposed changes within its authority.

CONFIGURATION MANAGEMENT (CM). A discipline applying technical and administrative direction to properly identify and document the functional characteristics of a configured item, to control changes to these characteristics, and to control, record, and audit the change implementation status of configured equipment and facilities.

CONTRACTORS: Any firm that enters into an agreement with Huntsville Center to perform a mutually agreed upon defined project or deliver a specific product. The term "A-E" is synonymous with contractors in the QA procedures checklist.

CORPS OF ENGINEERS GUIDE SPECIFICATIONS (CEGS). Specifications containing multiple design choices prepared by discipline engineers (in-house, other USACE agencies, or A-E firms) with the assistance of guide specifications engineers for use as a guide for a discipline engineer (USACE, DPW, or A-E firm) in the determination and documentation of project QC.

DD FORM 1391. A programming document used to obtain Congressional approval and funding for an MCA program.

DESIGN QUALITY CONTROL PLAN (DQCP). A quality control plan developed by the technical manager and included into the Project Management Plan (PMP) which is a technical management plan for a specific technical product or service. This quality control information contains herein will supplement the DQCP.

ENGINEER. Any engineering technician, geologist, engineer, or architect working for the Directorate of Engineering.

ENGINEERING CHANGE PROPOSAL (ECP). A vehicle to initiate changes to hardware, software, drawings, specifications, or procedural data that have been configuration baselined. An approved ECP modifies the baselined configuration. Any member organization of the CCB can originate an ECP.

MANAGEMENT PLAN. A document describing specific procedures, responsibilities, and relationships among participating organizations in support of a specific mission, function, and/or program. It is the primary document used to implement the management strategy/concept for accomplishing an assigned mission. (Frequently, when extremely detailed information is required, this document is referred to as an implementation or execution plan.)

MEMORANDUM OF UNDERSTANDING/AGREEMENT (MOU/MOA). A written agreement which states facts, intentions, procedures, and parameters for future actions and matters of coordination between USAESCH and other offices/agencies. Use of an MOU/MOA is a primary means for documenting the assignment/ transfer of a mission or function.

MICRO COMPUTER-AIDED COST-ESTIMATING SYSTEM (MCACES). A computer program used by USAESCH to develop Army Corps of Engineers standard construction cost estimates.

PRIOR CONDITION DRAWING. A copy of the record copy drawing prior to revising the record copy per an amendment or change order. The prior condition copy is used to establish the official audit trail.

PROJECT DEVELOPMENT BROCHURE (PDB). A Department of the Army criteria document. A PDB-1 is a programming document for an MCA project. This document is a general criteria document and accompanies the DD Form 1391 for approval of a project. A PDB-2 is a criteria document which serves as the basis for the design of an MCA project.

PROJECT ENGINEER. Primary engineer (in a given branch) performing work on a project. The project engineer is normally responsible for developing the Directorate of Engineering product (e.g., design, review of A-E submittal, etc.) and not for reviewing another USAESCH engineer's work.

PROJECT MANAGER (PM). The recognized leader of the project team and has leadership in the development and management of the Project Management Plan (PMP).

QUALITY. Conformance to properly developed requirements and meeting reasonable expectations of the customer.

QUALITY ASSURANCE. Quality assurance is the overall quality program which includes QMP, QCP, DQCP and other quality control procedures and regulations.

QUALITY CONTROL (QC) CHECKPOINT. Point at which a verifiable action that ensures the procedures being done is taken.

QUALITY DESIGN. A design that conforms to customer/client's needs and expectations and is consistent with appropriate technical criteria.

QUALITY MANAGEMENT PLAN (QMP). The plan instituted by the Directorate of Engineering to conform to the requirements of ER 1110-1-12.

QUALITY MANAGEMENT (QM). QM is a management philosophy which documented through a Quality Management Plan and applied through QCP and other appropriate procedures and techniques for ensuring established quality standards are attained, budgets and schedules are met.

QUALITY CONTROL. The process instituted by engineering personnel (A-E or in-house) to manage a document and obtain a "specific quality service or product, on schedule and within budget." In other words, the process for the performance of a task that meets the agreed-upon requirements of the customer. Quality control is designer's responsibility.

QUALITY CONTROL PLAN (QCP). A written technical management plan for a specific technical product.

QUALITY VERIFICATION. The process by which the Directorate of Engineering uses to determine whether the desired quality of service or product is realized. Quality verification is the reviewer's responsibility.

RECORD COPY. For all in-house and A-E designs, the final ink-plotted hard copy mylar of an approved design package. All amendments and change order revisions are made to the record copy.

SENIOR ENGINEER. Engineer responsible for coordinating and reviewing the work of project engineers.

TECHNICAL MANAGER (TM). Engineer responsible for coordinating all technical work on a project. The TM interfaces between project management and the Directorate of Engineering to ensure that the requirements of the Project Manager do not exceed the capabilities of the Directorate of Engineering.

TOTAL ARMY QUALITY (TAO). A management approach that focuses on continuous improvement to meet or exceed the expectations of internal and external customers.

TOTAL QUALITY MANAGEMENT (TQM). A strategic, integrated management system for achieving customer satisfaction which involves all managers and employees and used quantitative methods to continuously improve an organization's processes.

ERRATA SHEETS

ERRATA SHEET

Change 1 to HNC 1110-1-17

Table of Contents, page ii, was revised to cite new Appendix Q.

“Appendix Q. Procedure for Making Changes to the QA Manual” added to manual.

ERRATA SHEET
Change 2 to HNC 1110-1-17

Page D-1:

Subparagraph b of paragraph D-4. Responsibilities. The following text was deleted:

“b. The Systems Engineering Division is responsible for processing ECP’s for all activities concept and final design baselines.”

Renumbered paragraphs c and d; they are now b and c.

Revised subparagraph c, line 2: The following text was deleted: “. . . his or her division’s formal QC procedures.”

The following text was added: “. . . the QC procedures in CEHNC 1110-1-17.”

Pages D-1 and D-2:

Subparagraph b of paragraph D-5. Procedures. The following text was deleted:

“b. The CM engineer initiates the design baseline ECP, with input from the MSC/district and coordination with the appropriate project manager.”

Renumbered paragraphs c through k; they are now b thru j.

Revised subparagraph c, lines 3 - 6 to read: “. . . Directorate of Engineering technical branches review the ECP to evaluate the technical merits and cost and schedule impacts of the proposed change. The review comments are provided to the division chief for consolidation and signature (QC Checkpoint 3-3) and then sent to Systems Engineering Division via transmittal memorandum.”

Page 1-4:

Mike Stahl added as the PM advisor to the QA Oversight Team.

*****Original text pages prior to this change are attached for reference.*****

APPENDIX D

QC PROCEDURE NO. 3--ENGINEERING CHANGE PROPOSALS (ECP's)

D-1. PRODUCT. ECP's .

D-2. PURPOSE/SCOPE. This procedure describes the activities and responsibilities related to controlling ECP's and their quality within the Directorate of Engineering.

D-3. REFERENCES.

Program-specific configuration management plans, e.g., CEHND 1115-3-80, Chemical Stockpile Disposal Program (CSDP) Configuration Management Plan and CEHNC-ED-SY Standard Operating Procedures for Configuration Management, developed for the Directorate of Chemical Demilitarization.

D-4. RESPONSIBILITIES.

a. The Systems Engineering Division is responsible to the Director of Engineering for the coordination of all activities of the CM program within USAESCH.

b. The Systems Engineering Division is responsible for processing ECP's for all concept and final design baselines.

c. The branch chief of each reviewing branch is responsible for ensuring that a highly qualified person is assigned for ECP reviews.

d. The branch chief of each reviewing branch is responsible for ensuring that ECP reviews are accomplished in accordance with his or her division's formal QC procedures.

D-5. PROCEDURE.

a. The configuration management (CM) engineer receives the ECP and reviews it for completeness, then provides it to the program analyst for entry into the data base. If the ECP is determined to be incomplete, the CM engineer either returns it, via a transmittal memorandum signed (QC Checkpoint 3-1) by the Systems Engineering Division chief, to the originator with directions for resubmittal or documents the incompleteness and need for resubmittal in the minutes of the related Configuration Control Board (CCB) meeting, which are sent out via a transmittal memorandum signed (QC Checkpoint 3-2) by the Systems Engineering Division chief.

b. The CM engineer initiates the design baseline ECP, with input from the MSC/district and coordination with the appropriate project manager.

c. The CM engineer provides the ECP to the Service Branch for distribution to the technical divisions for review.

d. The CM engineer reviews the memorandum from the Service Branch to ensure that proper distribution was made. The project manager receives an information copy of the ECP, and the Directorate of Engineering technical divisions review the ECP to evaluate the technical merits and schedule impact of the proposed change. The review comments are provided to the Systems Engineering Division via transmittal memorandum from appropriate divisions, signed (QC Checkpoint 3-3) by applicable division chiefs. The CM engineer reviews the data for completeness and coordinates incomplete data with the reviewer.

e. The CM engineer compiles the USAESCH review comments and convenes a meeting to determine the USAESCH position with respect to the ECP's on the CCB meeting agenda prior to the CCB meeting.

f. The CM engineer sends, via signed (QC Checkpoint 3-4) facsimile transmission, a copy of the USAESCH position determinations and the appropriate review comments to the CCB chairman before the CCB meeting.

g. The CM engineer prepares minutes of CCB actions and distributes the minutes of the CCB meeting to relevant MSC's/districts and USAESCH in-house personnel. The minutes are reviewed and signed (QC Checkpoint 3-5) by the Operations Branch Chief.

h. The CM engineer prepares a summary-of-CCB-actions memorandum for the Configuration Policy Board chairman, the CCB chairman, and the CCB members. This memorandum is signed (QC Checkpoint 3-6) by the Division Engineer.

i. The CM engineer provides the CCB actions to the program analyst for updating of the data base.

j. The CM engineer reviews a printout of the data base for completeness and correctness. Incomplete or incorrect printouts are marked up, initialed (QC Checkpoint 3-7) by the CM engineer, and returned to the program analyst for correction.

k. The CM engineer provides a copy of the ECP, comments, and actions to the program analyst for filing in the Operations Branch files.

D-6. DOCUMENTATION. The Systems Engineering Division develops and maintains an ECP status report, by project. The Systems Engineering Division CM engineer provides a copy of the ECP, comments, and actions to the Systems Engineering Division for its ECP history file. The Systems Engineering Division manages and maintains this electronic history file data base. Reports are generated on an as-needed basis. A hard copy history file is maintained by the Operations Branch.

properly implemented and that up-to-date procedures are available to all personnel. After the audit, the team will prepare and submit to the Director of Engineering an audit report. The report will identify any problem areas and recommend possible solutions.

1-9. CONTROL OF QUALITY ASSURANCE RECORDS

The official Quality Assurance records will be maintained by the Engineering Directorate quality assurance engineer who is a member of the QA Oversight Team. These records will include the primary controlled Quality Assurance Plan, the official audit reports, and copies of all official training and skills documentation. The branch chief will be responsible for maintaining reference copies of all quality assurance files as outlined elsewhere in this document.

1-10. QUALITY ASSURANCE OVERSIGHT TEAM

There is an Engineering Directorate Quality Assurance Oversight Team which serves at the pleasure of the Director of Engineering to assure that the QA program document is maintained in current form and meets the current needs of HNC regarding total Army quality, ISO 9000, Army Performance Improvement Criteria (APIC), or other applicable requirements. This committee is also responsible for implementing the requirements of paragraph 1-8, Program Auditing, when required by the Director of Engineering. Currently, the committee is composed of:

	K. A. Edmundson	ED-ME	Chairman
	Paul Lahoud	ED-CS	Chief of Design
	Arkie Fanning	ED-SY	Q/A Engineer
	Robert Riffel	ED-CS	Member
	Adib Farsoun	ED-CS	Member
	Steve Pinke	ED-ME	Member
	Thomas Sykes	ED-ES	Member
Advisors are:	Bill Johnson	CH	
	TBD	PM	
	John Sikes	OE	
	Henrietta Cometa	CT	

Any committee member can be contacted for assistance in implementation of this document.

ERRATA SHEET
Change 3 to HNC 1110-1-17

Page 1-4:

James R. Hudson, ED-ME, replaced K. Edmundson as Chairman of the QA Oversight Team.
Susan Smallwood, CT, replaced H. Cometa as the CT representation to the QA Oversight Team.
Lee Sulzberger, ED-CS, appointed as a new member.

Page 3-1:

Subparagraph 3-2. Responsibility: The following text was added on line 4:

“The TM is responsible for securing all member and approval signatures on the DQCP prior to start of design.”

Page 3-3:

Subparagraph 3-9. Value Engineering. Lines 5-13 were revised as follows:

“If a VE study is necessary, the technical manager, project manager, and the HNC value engineer will determine when the VE study must be completed. Generally, the VE study should be conducted at or prior to 35% design. The customer may elect not to have HNC perform the required VE studies. This response must be in writing and will serve as the documentation for a waiver. The technical manager will notify the Director of Engineering before initiating design if the study has not been performed or if the waiver letter has not been received. The Director of Engineering will notify the Chief of Project Management that the design will not proceed beyond a specified date unless either a VE study is performed or the waiver letter is received in the VE office.”

Page 3-8:

The DQCP signature sheet was revised, per audit results of the DRMS program. The Technical Manager signature block is now included on all future DQCP's.

*****Original text pages prior to this change are attached for reference.*****

properly implemented and that up-to-date procedures are available to all personnel. After the audit, the team will prepare and submit to the Director of Engineering an audit report. The report will identify any problem areas and recommend possible solutions.

1-9. CONTROL OF QUALITY ASSURANCE RECORDS

The official Quality Assurance records will be maintained by the Engineering Directorate quality assurance engineer who is a member of the QA Oversight Team. These records will include the primary controlled Quality Assurance Plan, the official audit reports, and copies of all official training and skills documentation. The branch chief will be responsible for maintaining reference copies of all quality assurance files as outlined elsewhere in this document.

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	K. A. Edmundson	ED-ME	Chairman
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	Adib Farsoun	ED-CS	Member
	Steve Pinke	ED-ME	Member
	Thomas Sykes	ED-ES	Member
Advisors are:	Bill Johnson	CH	
	Mike Stahl	PM	
	John Sikes	OE	
	Henrietta Cometa	CT	

Any committee member can be contacted for assistance in implementation of this document.

CHAPTER 3

DESIGN QUALITY CONTROL PLAN (DQCP)

3-1. GENERAL

The Design Quality Control Plan is the project-specific management plan. This plan describes the way in which the particular design organization will produce the specific work. There are many important components to a DQCP. In most situations, many of the quality enhancing requirements are similar regardless of the type or size of a given project or task. For that reason, the development of a project-specific DQCP can reference generic components such as management philosophy, management approach, responsibilities, verification tools, and QA procedures as defined in the QCP. Project-specific requirements such as scheduling, cost control, resource utilization, reviews, value engineering, team members names, and any special or unique requirements must be established in the DQCP. For in-house work, an additional element covering the control of all in-house costs will be added. Contractors must also define the organizational management philosophy, structure, systems, and methods used to ensure quality. As a minimum, each DQCP will include the requirements outlined in appendix C of ER 1110-1-12. A DQCP will be prepared for all HNC products or services whether the work is accomplished by in-house personnel or by contract. The DQCP will be prepared and implemented in accordance with other chapters of this document, referenced regulations and guidance, and the guidance found in this chapter.

3-2. RESPONSIBILITY

For both in-house and contractor designs, the TM is responsible for preparing the DQCP as early in the design process as possible. Generally, the plan will be prepared before the predesign conference and after the scope of the project and the criteria have been defined by the client and design team.

a. For in-house designs, the TM will submit the DQCP to the Chief of Design for approval before the DQCP is included into the Project Management Plan.

b. For contracts, the TM is responsible for ensuring that the contractor's QCP is submitted to the appropriate disciplines for review and for submitting all review comments to the PM for processing. After all agreed upon comments are incorporated by the contractor, the QCP will be incorporated into the DQCP by the TM and submitted to the Chief of Design for approval.

3-3. MANAGEMENT AND DESIGN TEAM STRUCTURE

The DQCP will list the organizational composition of the design team including consultants, subcontractors, etc. The organizational chart will identify, by name, managers for both ED and PM, supervisors, designers for each discipline and review team members, and their responsibilities related to the project will be included.

3-8. CHECKLISTS

Checklists are powerful tools for the reviewers. The TM and project team should develop the appropriate checklist from standard checklists. Sample checklists are provided in ER 1110-1-12, appendix H. Checklists developed or chosen for the project or program will be specified in the DQCP.

3-9. VALUE ENGINEERING

Public Law 104-106 (February 1996) requires that all Federal agencies perform value engineering (VE). OMB Circular No. A-131 (May 93) further defines the requirement to require VE on all projects more than \$1 million. Prior to the predesign conference, the TM and the VE office will determine the VE requirements. These requirements will be discussed with the customer at the predesign conference. The customer may elect not to have HNC perform the required VE studies. This response must be in writing and will serve as the documentation for a waiver.

3-10. QUALITY MEASUREMENTS.

It is essential that we measure quality throughout the entire project delivery process. To realize a positive method of quality measurement, we will solicit customer feedback from within HNC and from external sources. Branch chiefs will use the number of significant review comments to measure the designer's attention or lack of attention to basic design parameters. This is most significant near the end of design. Design reviewers will appraise the design and submit their appraisal upon completion to the TM at the 90 percent review. Cost and time growth will also be used as a measurement of the designer's ability to manage his(her) work within assigned design dollars. The specific quality measurement tool chosen or specifically developed for a project or program will be included in the DQCP.

3-11. CONTENTS OF TYPICAL PLAN

Because most of the information followed in the Quality Assurance Program is the same regardless of the product or service, the information in the other chapters can be referenced in the DQCP. Any special requirements or project-specific deviations for the reference issues can be added to the DQCP. An example DQCP is an enclosure to this chapter.

DQCP (continued)

SIGNATURE BLOCKS OF PREPARERS

CIVIL TEAM MEMBER

BRANCH CHIEF

ARCHITECTURE TEAM MEMBER

BRANCH CHIEF

STRUCTURAL TEAM MEMBER

BRANCH CHIEF

MECHANICAL TEAM MEMBER

BRANCH CHIEF

ENVIRONMENTAL MEMBER

BRANCH CHIEF

INSTRUMENTATION MEMBER

BRANCH CHIEF

VALUE ENGINEER OFFICER

BRANCH CHIEF

ELECTRICAL TEAM MEMBER

BRANCH CHIEF

SPECIFICATION MEMBER

BRANCH CHIEF

CHIEF OF DESIGN

PROJECT MANAGEMENT

ERRATA SHEET
Change 4 to CEHNC 1110-1-17

Page 3-2:

Subparagraph 3-5. Design Cost/Control: The following text was added beginning on line 8:
“The Branch Chief will inform the TM when expenditures have reached 75% of the programmed amount.”

Page 3-3:

Subparagraph 3-11. Contents of a Typical Plan. The following sentences were added to this paragraph:
“The DQCP shall state what cost estimates are required to support the design. The DQCP must be signed by all personnel on the signatory sheet prior to design start (unless a waiver is obtained from the Director, Engineering Directorate) and the TM must sign the DQCP.”

Page P-10:

QC Procedure 11: ENVIRONMENTAL DOCUMENTS

The procedure number was changed from 11 to 10 (title did not change).

*****Original text pages prior to this change are attached for reference.*****

3-4. SCHEDULING

At the conclusion of the predesign conference, a detailed schedule showing the sequence of events in carrying out specific tasks will be completed and submitted to the Chief of Design for approval. The schedule will, as a minimum, include deliverable submittal dates, scheduled reviews by name and dates for each phase of the project, the quantity of each submittal, and the name and address of the organization to receive each submittal. The schedule will be approved and agreed to by all parties. This ensures that all parties are involved in the scheduling process.

3-5. DESIGN COST/CONTROL

Following the predesign conference, the overall design cost of the project will be prepared. The TM, in coordination with each design team member, will prepare any in-house design budgets. The TM and the Chief of Design, in coordination with the branch chiefs, will analyze the estimate and submit the agreed upon budget to the Project Manager. Each Branch Chief will monitor the work progress to ensure the level of work effort matches expenditures and that the remaining funds will cover the remaining work. The TM will, in coordination with the team member/branch chief, track overall expenditures to ensure the level of work is on track with project funding and schedules. When expenditures reach 75% of the programmed amount, the TM will call for a status review to ensure the projected cost to complete the project will be met. The TM should report to the Chief of Design and PM through periodic progress reports, either oral or written, the status of the task. These may include regular expenditure reports, and drawing and specification progress summaries showing percent completion. For contract work, the contractor will be required to submit these types of reports in writing to the Chief of Design and the PM. Producing a quality product can only be attained if the budget and schedules are met. The DQCP will address cost control measures.

3-6. DESIGN CRITERIA

Design criteria development is a coordinated effort between the user and the design team. Project criteria will be developed, including VE reviews and schedule reviews, as early in the planning process as possible. The criteria will be definitized and approved prior to the start of design to avoid lost effort. To achieve a higher confidence level in project criteria, a senior architect or engineer should conduct a review of the appropriate design directives and the scope of work prior to starting design to ensure that the design parameters necessary to define the project are properly identified and presented, and that mandatory design criteria (such as codes and standards) will be used. When necessary, reviewers should attend the predesign conference (or conferences during design period) to discuss the design approach with the designer. The TM will include all the appropriate checkpoints from those shown in appendixes B thru P in the DQCP.

3-7. DESIGN REVIEWS

An independent review of the designer's effort will be performed to enhance the quality of the product or service. This review is not intended to be a detailed check of the designer's work. The detailed design check is the responsibility of the designer. The level of reviews will be determined by the Chief of Design and the TM. Each project must be evaluated on a case-by-case basis. Complexity, size, and available funds are important considerations in determining the

types and number of reviews. Most in-house design reviews will be scheduled per the HNC Design Manual. For contracted services, scheduling of reviews will be the same criteria as in-house work. Design reviews will be properly scheduled and included in the DQCP.

3-8. CHECKLISTS

Checklists are powerful tools for the reviewers. The TM and project team should develop the appropriate checklist from standard checklists. Sample checklists are provided in ER 1110-1-12, appendix H. Checklists developed or chosen for the project or program will be specified in the DQCP.

3-9. VALUE ENGINEERING

Public Law 104-106 (February 1996) requires that all Federal agencies perform value engineering (VE). OMB Circular No. A-131 (May 93) further defines the requirement to require VE on all projects more than \$1 million. Prior to the predesign conference, the TM and the VE office will determine the VE requirements. These requirements will be discussed with the customer at the predesign conference. If a VE study is necessary, the technical manager, project manager, and the HNC value engineer will determine when the VE study must be completed. Generally, the VE study should be conducted at or prior to 35% design. The customer may elect not to have HNC perform the required VE studies. This response must be in writing and will serve as the documentation for a waiver. The technical manager will notify the Director of Engineering before initiating design if the study has not been performed or if the waiver letter has not been received. The Director of Engineering will notify the Chief of Project Management that the design will not proceed beyond a specified date unless either a VE study is performed or the waiver letter is received in the VE office.

3-10. QUALITY MEASUREMENTS.

It is essential that we measure quality throughout the entire project delivery process. To realize a positive method of quality measurement, we will solicit customer feedback from within HNC and from external sources. Branch chiefs will use the number of significant review comments to measure the designer's attention or lack of attention to basic design parameters. This is most significant near the end of design. Design reviewers will appraise the design and submit their appraisal upon completion to the TM at the 90 percent review. Cost and time growth will also be used as a measurement of the designer's ability to manage his(her) work within assigned design dollars. The specific quality measurement tool chosen or specifically developed for a project or program will be included in the DQCP.

3-11. CONTENTS OF TYPICAL PLAN

Because most of the information followed in the Quality Assurance Program is the same regardless of the product or service, the information in the other chapters can be referenced in the DQCP. Any special requirements or project-specific deviations for the reference issues can be added to the DQCP. An example DQCP is an enclosure to this chapter.

QC PROCEDURE 10: ENVIRONMENTAL DOCUMENTS

QC CHECKPOINT	VERIFICATION/ AUTHENTICATION	
	ACTION	
10-1, page K-2	Review of SOW	Technical manager initials SOW
10-2, page K-2	Review of environmental document	Senior engineer initials document
10-3, page K-2	Review of environmental document	Branch chief initials document
10-4, page K-2	Review of environmental document	Division chief initials document

QC PROCEDURE 11: GEOTECHNICAL INVESTIGATIONS AND TOPOGRAPHIC SURVEYS

QC CHECKPOINT	VERIFICATION/ AUTHENTICATION	
	ACTION	
11-1, page L-2	Review of geotechnical investigation or topo- graphic survey	Senior engineer initials CEHND Form 7 comments package
11-2 and 11-3, page L-2	Review of geotechnical investigation or topo- graphic survey	Branch chief initials CEHND Form 7 comments package and tasking memorandum
11-4 and 11-5, page L-2	Review of geotechnical investigation or topo- graphic survey	Division chief initials CEHND Form 7 comments package and tasking memorandum
11-6, 11-7, 11-8, and 11-9, page L-2	Review of geotechnical investigation or topo- graphic survey	Procedures used for design work by A-E contract are followed

ERRATA SHEET
Change 5 to CEHNC 1110-1-17

Page B-2:

Subparagraph b. Shop Drawings. Delete the section and substitute the new material.

“b. Shop Drawing Review Process (Chem Demil Typical).

(1) The Service Branch receives the shop drawing package from the site contractor, time stamps it, and fills out the applicable parts of the site transmittal form including hour, day, month and year of arrival in the Service Branch. It is evaluated for adherence to contract requirements (including completed ENG Form 4025). Correct entries on the site form are verified. Service Branch personnel will contact the site contractor if the shop drawing package is not complete. A determination is made as to which technical branch(es) will review the submittal using the Construction Specification Institute (CSI) index for the contract. The package, including a copy of the ENG Form 4025 and a DA Form 1222, is then logged into the shop drawing data base with a review completion date (QC Checkpoint 1-3) and then hand-carried to the appropriate technical branch(es) for review.

(2) The reviewing technical branch chief has the shop drawing package logged in and assigns it to a reviewing engineer/architect who makes a comprehensive technical review of the shop drawing submittal and prepares a CEHND Form 7, Design Review Comments, package and initials the site form. The action code for the submittal is entered on the CEHND Form 7 and a copy of the ENG Form 4025 (if action code A is used, no CEHND Form 124 is prepared). The CEHND Form 7, if prepared, and routing slip DA Form 1222 are initialed by the reviewing engineer (QC Checkpoint 1-4).

(3) The branch chief reviews the CEHND Form 7 comments package to ensure that a high-quality review has been made and initials the CEHND Form 7 and the site form (QC Checkpoint 1-5). The package is then logged out and returned to the Service Branch.

(4) Once the reviewed shop drawing package submittal is returned to the Service Branch personnel, the outgoing transmittal process begins. The DA Form 1222 is initialed by the Service Branch personnel, and the time and date received are annotated on the slip as well as in the log book. The returned transmittal is inventoried to ensure that all documents were properly returned and that the CEHND Form 7 is properly completed with an action code with the site form properly initialed. The CEHND Form 7 is reviewed to ensure that comments are consistent with the assigned action code with the site form properly filled in. When action codes are assigned, the original ENG Form 4025 will be annotated to request final disposition. If approval cannot be satisfied and a resubmittal is therefore required, the contractor will resubmit in the same manner as for a new submittal, except that Alpha codes will be added (e.g., No. 1 becomes 1A, B, etc.) Time and date of review completion are written on the site form (QC Checkpoint 1-6).

(5) The time and date of the reproduction of the review documents per contract requirements and, when applicable for resubmittal purposes, is noted on HND Form 637, and the quantity and quality of the reproduction is checked prior to packaging for transmittal (QC Checkpoint 1-7). Prior to submitting the final packages to the mailroom for mailing, the shop drawing package is logged out by annotating the mail-out date and final action code. One complete set of the transmittal package is retained for use as the CEHNC file copy, and the remaining packages are delivered to the mailroom for mailing.

(6) The Service Branch file copy is placed in an 8 1/2- by 11-inch folder and filed in transmittal number sequence as noted in the log book (QC Checkpoint 1-8). Comment forms and transmittal forms will be bound with drawings and other data. The routing slip, ENG Form 4025, and reproduction request, if any, will be stapled together and remain in the file for future checkout of the transmittal. Transmittal checkout will be accomplished using CEHND Form 43, completed in detail including description of data.

Page P-1: Delete QC Procedure 1: DOCUMENT CONTROL-Shop Drawings and insert the following new procedure “QC PROCEDURE 1A: DOCUMENT CONTROL-Shop Drawings Review Process (Chem Demil Typical) “

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
1-3, Page B-2	Reception and login-in of shop drawing package	Receive and inspect shop drawing package. Deliver to appropriate technical branch(es) for review.
1-4, Page B-3	Review of shop drawing package	Reviewing engineer/architect prepares comments (if required) and initials routing slip.
1-5, Page B-3	Review of shop drawing package comments.	Branch Chief reviews and initials engineer/architect comments.
1-6, Page B-3	Inventory returned shop drawing package	Service Branch personnel inventory returned shop drawing package with comments.
1-7, Page B-3	Reproduce copies of marked-up shop drawings	Service Branch personnel reproduce copies of marked-up shop drawings and transmit back to site.
1-8, Page B-4	File marked-up copy of shop drawings	Service Branch personnel file marked-up copy of shop drawings with comments, forms, transmittal sheets.

APPENDIX P

DIRECTORATE OF ENGINEERING QA CHECKLIST

QC PROCEDURE 1: DOCUMENT CONTROL--Design Review Documents

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
1-1, page B-2	Tracking of classified documents	Reviewing engineer signs log
1-2, page B-2	Tracking of unclassified documents	Service Branch projects unit employee signs CEHND Form 893

QC PROCEDURE 1: DOCUMENT CONTROL-Shop Drawings Review Process

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
1-3, page B-2	Receive and login-in of shop drawing package	Receive and inspect shop drawing package. Deliver to appropriate technical branch(es) for review.

QC PROCEDURE 2: ENGINEERING DESIGN DOCUMENTS--A-E Submittals

QC CHECKPOINT	ACTION	VERIFICATION/ AUTHENTICATION
2-1, page C-3	Review of A-E's submittal and preparation of CEHND Form 7 comments package	Project engineer initials CEHND Form 7 comments package
2-2, page C-3	Review of CEHND Form 7 comments package	Senior engineer initials CEHND Form 7 comments package
2-3, page C-3	Review of CEHND Form 7 comments package	Branch chief initials CEHND Form 7 comments package
2-4, page C-3	Review of CEHND Form 7 comments package	Division chief signs transmittal memorandum

ERRATA SHEET
Change 6 to CEHNC 1110-1-17
30 December 1997

Page 1-1:

Paragraph 1-1. INTRODUCTION.

Add new paragraph after the second paragraph.

"This manual has been checked against ISO 9001."

Page 3-3:

Subparagraph 3-8. Checklists. This paragraph is revised to state:

"Checklists are powerful tools for design reviewers. The TM and project team are encouraged to develop an appropriate checklist from standard checklists that may be available. (Samples are provided in ER 1110-1-12, appendix H.) When checklists are developed or chosen for the project or program, they will be specified in the DQCP."

Subparagraph 3-11. Contents of Typical Plan. Add the following sentence at the end of the paragraph.

"All CEHNC 1110-1-17 procedures must be included or excepted formally in the DQCP."

Page 3-4:

Add new paragraph 3-12.

"3-12. DQCP Control.

All DQCP's will have an official CEHNC control number. This number must be obtained from the Chief of Design prior to DQCP use."

Pages following 3-4 are renumbered.

Page C-6.

Subparagraph j: The paragraph is revised to read:

"The final specifications are assembled by the specification engineer and sent to the Directorate of Contracting which adds the appropriate clauses and submits the specification package to the Office of Counsel for review (if advertised from CEHNC). After Office of Counsel approval of the final specification package, the contracting specialist sends the package for reproduction and then delivery to the mailroom for distribution."

Subparagraph k: The last sentence of the paragraph is revised to read:

"When reproduction is completed, the drawing package is forwarded to the mailroom, where the final specifications and final drawings are combined to form the contract package."

Page C-7.

Paragraph C-6. Documentation. Add the following phrase to line 3 of the paragraph.

". . . retained by the TM and filed with the project file or DQCP . . ."

*****Original text pages prior to this change are attached for reference.*****

types and number of reviews. Most in-house design reviews will be scheduled per the HNC Design Manual. For contracted services, scheduling of reviews will be the same criteria as in-house work. Design reviews will be properly scheduled and included in the DQCP.

3-8. CHECKLISTS

Checklists are powerful tools for reviewers. The TM and project team are should develop an appropriate checklist from standard checklists. Samples are provided in ER 1110-1-12, appendix H. Checklists developed or chosen for the project or program will be specified in the DQCP.

3-9. VALUE ENGINEERING

Public Law 104-106 (February 1996) requires that all Federal agencies perform value engineering (VE). OMB Circular No. A-131 (May 93) further defines the requirement to require VE on all projects more than \$1 million. Prior to the predesign conference, the TM and the VE office will determine the VE requirements. These requirements will be discussed with the customer at the predesign conference. If a VE study is necessary, the technical manager, project manager, and the HNC value engineer will determine when the VE study must be completed. Generally, the VE study should be conducted at or prior to 35% design. The customer may elect not to have HNC perform the required VE studies. This response must be in writing and will serve as the documentation for a waiver. The technical manager will notify the Director of Engineering before initiating design if the study has not been performed or if the waiver letter has not been received. The Director of Engineering will notify the Chief of Project Management that the design will not proceed beyond a specified date unless either a VE study is performed or the waiver letter is received in the VE office.

3-10. QUALITY MEASUREMENTS

It is essential that we measure quality throughout the entire project delivery process. To realize a positive method of quality measurement, we will solicit customer feedback from within HNC and from external sources. Branch chiefs will use the number of significant review comments to measure the designer's attention or lack of attention to basic design parameters. This is most significant near the end of design. Design reviewers will appraise the design and submit their appraisal upon completion to the TM at the 90 percent review. Cost and time growth will also be used as a measurement of the designer's ability to manage his(her) work within assigned design dollars. The specific quality measurement tool chosen or specifically developed for a project or program will be included in the DQCP.

3-11. CONTENTS OF TYPICAL PLAN

Because most of the information followed in the Quality Assurance Program is the same regardless of the product or service, the information in the other chapters can be referenced in the DQCP. The DQCP shall state what cost estimates are required to support the design. The DQCP must be signed by all personnel on the signatory sheet prior to design start (unless a waiver is obtained from the Director, Engineering Directorate); the TM must also sign the DQCP. Any special requirements or project-specific deviations for the reference issues can be added to the DQCP. An example DQCP is an enclosure to this chapter.

design products will be initialed and dated (QC Checkpoint 2-16). The design checklists (as applicable) and the annotated comments will constitute the documentation for this activity.

i. After incorporation of the independent technical review team comments, the final drawings, specifications, design analyses, design calculations, and design studies are prepared by each branch. The final drawings are initialed/signed (QC Checkpoints 2-17, 2-18, 2-19, and 2-20 respectively) by the project engineer, drafter, project checker, and branch chief. Then they are forwarded to the Architectural Branch to be assembled into the final construction bid package. As a part of the final submittal to the Architectural Branch, each design branch will submit (on an 8-1/2- by 11-inch sheet of paper) the CADD directory and design file names for each drawing. The Architectural Branch will create a baseline CADD tape to be stored in the main computer room. Revisions to the CADD tape will be accomplished only under the direction of the project manager and in accordance with the CADD SOP. The Architectural Branch sends the index sheets to the MSC/district for approval. After receiving the signed index sheets from the MSC/district, approval is obtained from the division chiefs. The division chief's signature (QC Checkpoint 2-21) on the index sheets of the drawings package authenticates the design products of his or her division and signifies that the QC procedure has been properly implemented by his or her division. After the division chiefs have approved the drawings package, the Chief of Design, the Director of Engineering, and the HNC Commanding Officer indicate their approval by signing (QC Checkpoints 2-22, 2-23, and 2-24, respectively) the drawings package. The final drawings package is then forwarded to the Service Branch.

j. The final specifications are assembled by the specification engineer and sent to the Directorate of Contracting, which adds the appropriate contract clauses and submits the specifications package to the Office of Counsel for review. The Office of Counsel comments are incorporated into the final package by the Directorate of Contracting Contract Specialist, working with the specifications engineer. After Office of Counsel approval of the final package, the Directorate of Contracting sends it for reproduction and subsequent delivery to the mailroom.

k. The Service Branch will receive and log in the original drawings package from the Architectural Branch. After receiving instructions from the contract specialist as to the number of copies of the drawings package required for the contract, the Service Branch sends the drawing originals to reproduction. When reproduction is completed, the drawings packages are forwarded to the mailroom, where the specifications and drawings are combined to form the contract package.

l. After receiving instructions from the contract specialist as to the number of copies of the contract package required for in-house distribution, the Service Branch makes distribution to appropriate USAESCH personnel in accordance with a listing provided by the project manager.

m. The contract specialist prepares the mailing labels for outside distribution and directs the handling of the contract packages relative to this distribution.

n. Drawing changes that require changing baselined documentation will be handled in accordance with the QC procedure for engineering change proposals (ECP's) (see appendix D).

o. For tasks involving the review of shop drawings, the following procedure will be followed.

(1) The project engineer makes a comprehensive review of the shop drawing submittal and prepares a CEHND Form 124 comments package. The action code for the submittal is entered on the CEHND Form 124 and copy of the ENG Form 4025, if action code A is used no CEHND Form 124 is prepared. The CEHND Form 124, if prepared, and routing slip DA Form 1222 are initialed by the project engineer (QC Checkpoints 2-25 and 2-26).

(2) The senior engineer, as applicable, will review the CEHND Form 124 comments package and check it for the project engineers initials. When his or her review is complete, the senior engineer will initial (QC Checkpoint 2-27) the package and forward it to the branch chief. The branch chief may perform this function.

(3) The branch chief will review the CEHND Form 124 comments package to ensure that a high-quality review has been made and initials the CEHND Form 124 and the DA Form 1222 (QC Checkpoints 2-28 and 2-29). The package is then returned to the division log in point for return to the Service Branch.

C-6. DOCUMENTATION. Documentation requirements will be as specified in paragraph C-5. A copy of the design checklists (as applicable) and the annotated review comments will be retained by each branch as permanent QA records. Originals for all design products, except specifications, will be retained by the Service Branch as permanent QA records. The final specifications originals will be retained by the Directorate of Contracting as permanent QA records.